ADDENDUM #1

Date of Addendum: 4/27/2017

NOTICE TO ALL BIDDERS AND PLANHOLDERS

The Contract Documents for the above-referenced Project are modified as set forth in this Addendum. The original Contract Documents and any previously issued addenda remain in full force and effect, except as modified by this Addendum, which is hereby made part of the Contract Documents. Bidder shall take this Addendum into consideration when preparing and submitting a bid, and shall acknowledge receipt of this Addendum in the space provided on the Bid Form.

BID SUBMITTAL DEADLINE

The bid submittal deadline remains the same and is not changed by this Addendum.

1.0 – SPECIFICATIONS

Item	Section No.	Description of Change
1.1	01900	Update requirements for the coordination with the Railroad.
1.2	02114	Clarified the measurement and payment for the installation of gates.
1.3	02230	Updated specification to clarify measurement and payment for the temporary access road construction.
1.4	02528	Added the measurement and payment for the concrete drain for the construction of the MRL Bridge retaining walls
1.5	03310	Update specification to include Reinforced Concrete Retaining Walls
1.6	05120	Addition of Structural Steel Specification
1.7	07620	Updated the measurement and payment for the installation of roof flashing

2.0 – DRAWINGS

Item	Sheet No.	Description of Change
2.1	E2.0	The sheet has been revised to show the removal of the work in the I-90 corridor from this contract, and the addition of the electrical service lines from the Gateway Area to the MRL bridge.
2.2	E3.0	This sheet has been revised to reflect the electrical service to the MRL bridge from the Gateway Area.

3.0 – QUESTIONS AND ANSWERS

The following questions and answers are provided as a matter of information to clarify issues raised about the Contract Documents. To the extent that changes to the Contract Documents are required based on the questions received, the Contract Documents have been modified as noted above in the Specifications and Drawings sections of this Addendum.

Item	Questions and Answers
3.1	Question: Will flaggers be required for work within 25' of tracks even if the work is below the track (i.e. steel mesh roof) Answer: Grade separated work such as trail building or catchment installation will not need a flagger per se even though they may be within 25 feet of tracks. There will need to be a railroad flagger assigned whenever the contractor needs to cross at the temporary grade crossing due to the limited sight distance for vehicles at the crossing location. The agreement

<table>
<tr><td></td><td>requires a fence with gates be installed with a railroad-only lock on gates limiting access to the temporary grade crossing to avoid uncontrolled contractor crossings at the temporary grade crossing. Our experience is that “locking in” a contractor does not work due to the inevitable parts run or delivery to the site necessitating opening the locked gate for access.
See Railroad Agreement for additional requirements.</td></tr>
<tr><td>3.2</td><td>Question: Will the temporary access included in Alt #2 need to be removed?

Answer: Yes. The temporary access road will need to be removed and the site restored to preconstruction condition. Construct the temporary access road with imported material.</td></tr>
<tr><td>3.3</td><td>Question: Will camping be allowed on the site?

Answer: A maximum of 2 camping trailers will be allowed to park on site, however, no hookups will be available. The actual parking locations must be approved by the Park Manager prior to mobilization.</td></tr>
<tr><td>3.4</td><td>Question: What permits will be contractor provided?

Answer: Unless otherwise notes, All permits are the responsibility of the contractor except as follows:
- Missoula County Approach Permit and Paving Permit
- MDT Encroachment Permit for I-90 and Hwy 200
- Environmental Permits 124, 318, and 404
- Floodplain Permit
- MRL Encroachment Permits
- Septic Permits for Latrines
- Building Permit for the Latrines will be obtained by the owner prior to ordering them.</td></tr>
<tr><td>3.5</td><td>Question: Will the owner provide the building permit for the Plaza, including the electrical, excavation, etc?

Answer: No, all permits associated with the construction of the plaza are the responsibility of the contractor.</td></tr>
<tr><td>3.6</td><td>Question: Does the material balance on the project?

Answer: It is expected that there will be a surplus of approximately 600 CY of material. The quantities were calculated with the assumption that 20% of the excavated material will be un-usable for embankment. Unusable material must be hauled off and disposed of by the contractor but surplus material may be wasted adjacent to Parking Lot A, or as approved by the Engineer.

The unadjusted quantities for each feature are as follows:
<table>
<tr><th>Location</th><th>Excavation (CY)</th><th>Embankment (CY)</th></tr>
<tr><td>Access Rd</td><td>3448</td><td>1895</td></tr>
<tr><td>Gateway Road</td><td>784</td><td>23</td></tr>
<tr><td>Trail A</td><td>1400</td><td>847</td></tr>
<tr><td>Trail F</td><td>957</td><td>9</td></tr>
<tr><td>Trail G</td><td>247</td><td>24</td></tr>
<tr><td>Parking Areas (A)</td><td>3041</td><td>4164</td></tr>
<tr><td>Gateway Parking</td><td>850</td><td>938</td></tr>
<tr><td>Pavilion Grading</td><td></td><td>90</td></tr>
<tr><td>Total</td><td>10727</td><td>7990</td></tr>
</table></td></tr>
<tr><td>3.7</td><td>Question: Will dewatering be required for the road shoulder work on Sheet 15?

Answer: Depending on the time of year and the elevation of the river, dewatering may be required.</td></tr>
</table>

3.8	Question: Will a substitution of gabions be allowed? Answer: The work associated with the gabion baskets, located under the I-90 highway bridges, is not being awarded as part of this contract.
3.8	Question: The electrical line providing service to the MRL bridge crosses under the I-90 bridge, which is not being awarded in this contract. Wil electrical service be required at the MRL bridge? Answer: Yes, the electrical design has been revised to extend the electrical lines from the Gateway parking lot.
3.9	Question: The project specifications call for staining the concrete sidewalk. Do you want colored concrete or can the sidewalk be stained after installation? Answer: The stained concrete sidewalk is not currently required for this contract. The owner may add it to the contract at a later time.

4.0 – INFORMATION

The following item(s) are provided as a matter of information only to all bidders and plan holders and do not modify or become part of the Contract Documents.

Item	Description
4.1	Draft - Construction and Maintenance Agreement for Access Road to Milltown State Park
4.2	MRL Exhibit C – Requirements for Contractors, Public Employees and Others when working on the Railroad's Right of Way

Attachments:

- Specification
- Drawings
- MRL Construction and Maintenance Agreement and Exhibit C

END OF ADDENDUM

SECTION 01900

RAILROAD COORDINATION

PART 1: GENERAL

1.1 DESCRIPTION

A. This special provision describes the requirements for coordinating and sequencing work under the contract documents that is located on Montana Rail Link Railroad, herein called the MRL, controlled right-of-way.

B. This work includes construction of the temporary access road by the Contractor, installation of temporary at-grade crossing over MRL mainline tracks by the railroad and construction by the Contractor of retaining walls, protective roof over the trail crossing under MRL Bridge 113.1, trail adjacent to the west abutment at MRL Bridge 113.1, and construction by the contractor for a protective roof over the road crossing under MRL Bridge 114.1.

C. The Department of Fish, Wildlife and Parks, herein called the Owner, has entered into an agreement, herein called Railroad Agreement, with MRL and this is included as part of the contract documents. The Contractor shall perform all work on railroad property in accordance with the requirements included in the Railroad Agreement, and as indicated in this provision, whichever is more restrictive.

D. The Contractor must comply with all of the Railroad requirements that are current at the time of the bid. If there are any conflict between this specification and the requirements of the Railroad, the current railroad requirements at the time of the bid will govern on the project.

1.2 RAILROAD COORDINATION

A. The Contractor shall notify MRL at least thirty (30) days in advance of the date on which work is expected to start on the railroad right-of-way. Written approval from MRL and the Engineer are required prior to mobilizing and beginning the work.

B. Furnish signed copies of the "Contractor Requirements and Acknowledgment for Working on Railroad Right of Way". The document will be provided by the Owner or may be obtained from MRL prior to construction.

C. Provide advance notice, as agreed to between the Contractor and railway officials, before working on railway property or hauling across railway tracks.

D. Furnish insurance for all work performed as required in Subsection 1.5 or the contract. Make arrangements with MRL for railway crossings not specified in the

contract at Contractor expense. No work shall commence on MRL right-of-way without an approved insurance policy.

A. Contact information for coordination of work with MRL is:

Nicholas W. Bailey, PE
Public Works Engineer
Post Office Box 16390
101 International Drive
Missoula, MT 59808
Phone: 406.829.2409

Dustin Hayes
Track Supervisor
Phone: 406-523-1526

1.3 CONSTRUCTION PLAN AND SCHEDULE

A. The Contractor shall prepare and submit a detailed construction plan and schedule for all work occurring on MRL property. Submit the proposed plan and schedule to the Engineer and MRL for approval at least thirty (30) days prior to beginning the work. The submittal requires approval from the Engineer and MRL in order to commence work on MRL property.

B. The construction plan shall clearly indicate the proposed methods of construction, type of equipment that is proposed, duration of construction activities and location of materials that might be stockpiled on or near railroad property.

C. The construction plan shall include names and occupations of all personnel working on railroad property. The plan shall demonstrate that those workers have the appropriate railroad training certifications.

D. Written approval from the Engineer and MRL is required to begin the work.

1.4 EMERGENCY ACTION PLAN

A. The Contractor shall develop and submit an emergency action plan indicating the location of the site, contact names and phone numbers, access to the site, instructions for emergency response, and location of the nearest hospitals. The plan shall also cover the Contractor's means of fire suppression that may include the phone number and location of the nearest fire department. The plan shall cover all items required in the event of an emergency at the site.

1.5 INSURANCE REQUIREMENTS

A. Furnish Railroad Protective Liability Insurance on behalf of MRL when equipment or personnel are located or work is done on any MRL right of way. Insurance coverage shall comply with the requirements included in the Railroad Agreement.

B. Submit copies of the Railroad Protective Liability Insurance policy and a certificate of insurance for transmittal to and approval by MRL. Do not use or enter MRL property until MRL approval is received and the policies are in effect. This applies to all work done as a part of the project.

C. The insurance requirements are a condition precedent to the contract. Failure to obtain and maintain all required insurance, or permitting the insurance to lapse before the contract is complete and accepted is considered a material breach of the contract.

1.6 RAILROAD REQUIREMENTS

A. Comply with the rules and regulations of MRL and the instructions of the MRL's representatives in relation to the proper manner of protecting the tracks and property of MRL and the traffic moving on such tracks, as well as the wires, signals, and other property of MRL, its tenants or licensees, at and in the vicinity of the work area during construction.

B. Perform work in such manner and at such times that do not endanger, delay or interfere with the safe and timely operation of the tracks and property of MRL and the traffic moving on such tracks, as well as the wires, signals, and other property of MRL its tenants, or licensees.

C. Take protective measures as are necessary to keep railroad facilities, including track ballast, free of sand, debris, and other foreign objects and materials resulting from the construction operations. MRL may choose to repair damage to railroad facilities resulting from Contractor's operations with the cost being borne by the Contractor.

D. Personnel working on railroad property shall have the appropriate current railroad safety training certifications as required by the Railroad Agreement.

1.7 FLAGGING PROTECTION

A. Railroad Flagging is required for all construction activities, unless specifically identified otherwise, that are located within 25-feet measured horizontally from the centerline of the nearest track and activities that have the potential to foul this zone.

B. Railroad flagging is required for all operations involving the installation of soldier piles, lagging, and excavation for the retaining wall at Bridge 113.1.

C. Schedule work and coordinate flagging requirements with the railroad as set forth in Railroad Agreement. The Contractor shall provide a minimum 48 hours notice to MRL in advance of when flagging services are required.

D. Flagging services will be performed by qualified railroad flaggers provided by MRL at the current rate. The cost per hour for one Flagger is based on a standard 8 hour day, with time and one-half or double time for overtime, rest days, and holidays. The estimated cost for each flagger includes vacation allowance, paid holidays, Railway and unemployment insurance, public liability and property damage insurance, health and welfare benefits, vehicle, transportation, meals, lodging, radio, equipment, supervision and other costs incidental to performing flagging services.

1.8 GENERAL SAFETY REQUIREMENTS

A. Prior to the start of all projects, ensure all employees of the Contractor, subcontractors, agents, and invitees receive Safety Orientation from the Contractor's Safety Officer or a qualified MRL representative. The Contractor's Safety Officer is to review MRL safety guidelines to familiarize their employees with safety issues that exist when working in a railroad environment. This should be reviewed at least weekly, and with any new employee working on MRL property. The Contractor's Supervisor and/or Safety Officer are responsible for instructing employees regarding the MRL's Safety guidelines and ensuring compliance with these guidelines.

B. No employee of the Contractor, its subcontractors, agents or invitees may enter MRL Property without first having completed Railway's Engineering Contractor Safety Orientation, found on the web site www.contractororientation.com. The Contractor must ensure that each of its employees, subcontractors, agents or invitees completes MRL's Engineering Contractor Safety Orientation through internet sessions before any work is performed on the Project. Additionally, the Contractor must ensure that each and every one of its employees, subcontractors, agents or invitees possesses a card certifying completion of the Railway Contractor Safety Orientation before entering Railway Property. The Contractor is responsible for the cost of the Railway Contractor Safety Orientation. The Contractor must renew the Railway Contractor Safety Orientation annually. Further clarification can be found on the web site or from the MRL's Representative.

C. Contractor must comply with all of the Personal Protective Equipment requirements of the Railroad and as required by State and Federal regulations.

D. Before beginning any task on MRL property, conduct a complete job safety briefing with all individuals involved with the task, and again if the task changes. If the task is within 25-feet of any track, include the local Track Supervisor or his representative and the procedures to be used to protect employees, subcontractors,

agents, or invitees from moving any equipment adjacent to or across any railroad tracks. At a minimum, one job briefing will be held each day before the start of work.

E. Immediately report damage to MRL property, or hazards noticed on passing trains, to the MRL's representative. Vehicle or machines which may come in contact with a track, signal equipment, or structure (bridge) could result in a train derailment. Report these by the quickest means possible to the MRL representative. Local emergency numbers are to be obtained from the MRL representative prior to the start of any work. Post these numbers at the job site.

A. Perform the work to minimize impact to the existing railroad property. Report any damage to the Engineer, and repair any damage at no cost to the owner.

PART 2: PRODUCTS – NOT USED

PART 3: EXECUTION

3.1 INTERFERENCE WITH RAILROAD OPERATIONS

E. Perform work on railroad right-of-way without interfering with the movements of trains or traffic on railway property. Do not cross the railway right-of-way or tracks except at temporary or existing, open public grade crossings, and as approved by MRL.

F. The Contractor shall so arrange and conduct his work that there will be no interference with railroad operations, including train, signal, telephone and telegraphic services, or damage to the property of MRL or to the poles, wire, and other facilities of tenants on the rights-of-way of the Railroad Company. Wherever work is liable to affect the operations or safety of trains, the method of doing such work shall first be submitted to the Railroad Engineer for approval, but such approval shall not relieve the Contractor from liability.

G. Should conditions arising from or in connection with the work, require that immediate and unusual provisions be made to protect train operations and property of MRL, it shall be a part of the required services by the Contractor to make such provisions and if, in the judgement of MRL such provisions is insufficient, MRL or the Engineer, may at the expense of the Contractor, require or provide such provisions as may be deemed necessary.

H. The Contractor will not be permitted to provide less than 11-feet of horizontal temporary clearance to any construction falsework or equipment, measured from the centerline of the nearest track, during construction of the proposed retaining walls at the MRL Bridge 113.1.

3.2 DAMAGES

A. The Contractor shall assume all liability for any and all damages to his work, employees, servants, equipment and materials caused by railroad traffic.

B. Any cost incurred by MRL for repairing damages to its property or to property of its tenants, caused by or resulting from the operations of the Contractor, shall be paid directly to MRL by the Contractor.

3.3 STORAGE OF MATERIALS

A. Materials and equipment shall not be stored where they will interfere with railroad operations, nor on the right-of-way of MRL without first having obtained permission from MRL, and such permission will be with the understanding that MRL will not be liable for damage to such material and equipment from any cause and that MRL may move or require the Contractor to move, at the Contractor's expense, such material and equipment.

3.4 TEMPORARY RAILROAD GRADE CROSSINGS

A. The Owner has entered into an agreement and made arrangements with MRL for use of the property. Construct access roads in accordance with the Plans, these provisions and the Railroad Agreement.

B. The Contractor shall construct the road and approaches in accordance with the Plans and to the satisfaction of the Engineer and MRL. Construct the temporary crossing up to the railroad portion of the work such that it does not interrupt existing drainage patterns

C. MRL will provide materials, including the railroad track crossing material and perform all work within two feet of the rail.

D. The temporary roadway must be removed upon completion of the project. The Contractor shall restore the property including any drainage ditches. Removal of planking or other items within 2ft of the rail will be performed by MRL.

E. Unless otherwise approved, the Contractor will need to have a railroad flagman on site for construction or any work activities that are located within 25-feet from the centerline of the nearest track or have the potential to foul this zone.

F. The Contractor will need to have a railroad flagman on site during any use of the temporary crossing. The crossings must be physically barricaded with a fence, gate, and railroad-only lock on gates during times that it is not required for use and a flagger is not present.

3.5 COMPLETION AND ACCEPTANCE OF WORK

A. Upon completion of the work, the Contractor shall remove from within the limits of the railroad right of way all machinery, equipment, surplus materials, rubbish or temporary buildings of the Contractor, and leave said rights-of-way in a neat and orderly condition. After the final inspection has been made and work found to be completed in a satisfactory manner acceptable to the Engineer and MRL, the Engineer will be notified of MRL's acceptance in writing within ten (10) days or as soon thereafter as practicable.

PART 4: MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Consider all costs associated with this item incidental to the Temporary Construction Access Road bid item.

END OF SECTION

SECTION 02114

RELOCATING, INSTALLING, OR REMOVING UTILITY POLES, STREET SIGNS, INFORMATIONAL SIGNS, BENCHES AND FENCES

PART 1: GENERAL

1.1 DESCRIPTION

A. This item consists of relocating, installing, or removing utility poles, signs, benches, bollards, and fences as shown in the contract documents.

PART 2: PRODUCTS

2.1 Chain Link Fence

A. Furnish fabric, posts, rails, ties, bands, bars, rods and other fittings, and hardware conforming to AASHTO M181.

2.2 Signs

A. Posts. Furnish wood posts that are straight, smooth, and without defects affecting strength, durability, or appearance. Furnish posts conforming to AASHTO M 168. Treat the posts according to Category 4A of the AWPA Standard U1-UC4A, *Ground Contract, General Use* for waterborne preservative treatments ACA, ACZA, or CCA.

B. Retroreflective Sheeting. Conform to ASTM D4956, including supplementary conditions.

C. Panels. Conform to the following:

1) Plywood. Furnish exterior Grade B-B high –density overlay plywood or better conforming to NIST Products Standard PS A, *Construction and Industrial Plywood.* Use 1/2 –inch thick plywood for sign panels with a facial area 4 square feet or less and the horizontal dimension no greater that the vertical dimension. Use ¾-inch thick plywood for larger panels.

2) Aluminum. Furnish panels conforming to ASTM B209, alloy 6061-T6 or 5052-H38. Fabricate temporary panels and permanent panels smaller or equal to 30 by 30 inches from 0.080-inch thick aluminum sheets. Fabricate larger permanent panels from 0.125-inch thick aluminum sheets

D. Hardware. Furnish galvanized steel or aluminum alloy lag screws, washers, clip angles, wood screws, shear plates, U-bolts, clamps, bolts, nuts, and other fasteners.
Galvanize steel hardware according to AASHTO M 232.
For aluminum alloy bolts, nuts, and washers, conform to American standard heavy hexagon ANSI B18.2. For threads, conform to American standard coarse series, Class 2 fit, ANSI specification B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).
For neoprene or nylon washers, furnish ⅛ inch thick by 1-inch minimum outside diameter with maximum allowable applied torque 480 inch-pounds.

2.2 Bollards

A. Provide cast iron cylindrical bollard that is 48" high x 8" diameter with a rounded top, meeting the requirements of ASTM A513 Type 1. Provide a heavy duty steel sleeve with locking cover plate meeting the requirements of ASTM A513 Type 5. The bollards must be completely removable from the sleeve and provide a flush surface when the lid drops down
B. Prime all steel surfaces with rust and corrosion resistant, zinc rich primer with 5,000 hour salt spray performance. Finish the bollard to be powder coated yellow that meets decorative and functional requirements for gloss retention, physical properties, chemical resistance, and weatherability.
C. Furnish concrete meeting the requirements of Section 03310, STRUCTURAL CONCRETE.
D. Provide schedule 40 PVC pipe for the drain lines.
E. Provide deformed reinforcing steel meeting the requirements of Section 03210 REINFORCING STEEL.

PART 3: EXECUTION

3.1 UTILITY POLES

F. Coordinate with affected utility companies that need to move power, street light, and utility poles, unless they are designated in the contract documents to be removed or relocated by the Contractor.

G. When relocating or removing power poles, street light poles and utility poles, comply with any applicable requirements of the contract documents.

3.2 STREET AND TRAFFIC CONTROL SIGNS

A. Remove and reinstall all street, stop and other traffic control/direction signs designated to be relocated by the Contractor as shown in the contract documents, or as designated by the Engineer. Include removing, temporarily installing, storing, and permanently installing the signs.

B. Install all street, stop, traffic control, and other signs as shown in the contract documents or as designated by the Engineer.

C. The locations shown in the contract documents for street lights, street signs, power poles, utility poles are approximate only. The specific locations are to be designated by the Engineer.

D. Relocate all signs within the staked grading limits whose existing locations do not conform to final plan locations. Also relocate signs outside the staked grading limits to conform to final plan locations.

E. Preserve all street, stop and other traffic and direction signs that are to remain in place. Should any such signs be moved for the contractor's convenience, permanently reinstall the signs after construction the road or parking lot improvements are complete. Assume responsibility for any damage to such signs. No extra compensation will be allowed for preserving, removing or replacing stop and traffic control and direction signs designated to remain in place, since this work is considered incidental to the contract unit prices for the various items of the contract.

F. Where stop signs and traffic direction or control signs are temporarily removed, but are needed for traffic reasons during construction, temporarily install a similar stop sign or traffic direction sign in locations acceptable to the Engineer. Assure that the temporary signs remain in place until the permanent stop or traffic control signs are in place.

G. Do not install street signs temporarily.

H. Store signs which are not used for temporary installation.

I. Set all permanent signs according to the detail as shown on the drawings. Replace all signs which have been damaged after removal with new signs.

J. Install sign systems at locations shown on the drawings or as directed in the field by the Engineer. Sign types are included on the drawings. Assure that all sign sizes and locations conform to the latest issue of the Manual on Uniform Traffic

Control Devices (MUTCD).

K. Remove all signs designated for removal so not to damage the signs. Salvage and deliver all such damaged signs to the Engineer.

3.3 BENCHES

A. Construct bench foundation pad and placement of anchor bolts per instructions and specifications where shown on the drawings. Benches will be provided by the Owner. Contractor is responsible for furnishing all labor, materials, and hardware for the successful installation of the benches. Refer to Section 03310, Structural Concrete, for specifications on construction of the concrete bench foundation pads.

3.4 FENCES AND GATES

A. All references to fences designated for Removal, Relocate, Replace, or Installation also include gates that are located within the limits identified in the construction documents.

B. Remove and Relocate - Fences within the staked construction limits shall be carefully removed and stored at a location where they will not be damaged. Before removing fencing on any property, contact the land owner to coordinate the work. Relocate the fence to the new location as staked in the field or as directed by the Engineer. Provide all materials, hardware, and labor necessary to relocate the fence. In some cases it may be necessary to replace certain fence posts. Replace posts as directed by the Engineer with posts of like material and color. Obtain approval from the Engineer before installing contractor furnished posts.

C. Remove and Replace - Fences within the staked construction limits shall be carefully removed and stored at a location where they will not be damaged. Before removing fencing on any property, contact the land owner to coordinate the work. Replace the fence in the same location from where it was removed or in a location as directed by the Engineer. Provide all materials, hardware, and labor necessary to reinstall the fence. In some cases it may be necessary to replace certain fence posts. Replace posts as directed by the Engineer with posts of like material and color. Obtain approval from the Engineer before installing contractor furnished posts.

D. Installation – Install the fence to the dimensions called for in the contract documents.

1) Top Rail – Install top rails through the loop caps of the line posts, forming a continuous brace from end-to-end of each stretch of fence. Join lengths of top rail with sleeve type couplings. Securely fasten top rails to terminal posts by pressed steel fittings or other appropriate means.
2) Bottom Rail - Install bottom rails between posts. Securely fasten bottom rails to terminal posts by pressed steel fittings or other appropriate means.
3) Fence Fabric – Place fence fabric on the side of the post facing the Park unless otherwise specified by the Engineer.

3.5 INFORMATIONAL SIGNS

A. Construct informational sign foundation pad and placement of anchor bolts per instructions and specifications where shown on the drawings. Informational content will be provided by the Owner. Contractor is responsible for furnishing all labor, materials, and hardware for the successful installation of the informational signs.

3.6 BOLLARDS

A. Install bollard following manufacturer's installation instructions.
B. Protect bollards against damage. Damaged, cracked, chipped, deformed or marred bollards will not be accepted. Field touch-up minor imperfections in accordance with manufacturer's instructions.
C. Install schedule 40 PVC drain line, reinforcing steel, and the heavy duty steel sleeve prior to placing concrete. Grade drain line at a minimum -1% slope till it daylights. Orient the steel sleeves as shown in the contract documents, to be vertical. Place and finish concrete as shown in the contract documents.

PART 4: MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Measurement and payment for the following items is made only if listed as separate pay items in the contract documents. If not so listed separately, these items will not be paid for separately but are to be included as incidental to the other pay items of the contract documents.

B. Payment indicated to include complete compensation for all labor, equipment, materials and incidentals required for the completion of the work.

4.2 STREET AND TRAFFIC CONTROL SIGNS

A. Reinstall all street, stop and traffic control or direction signs removed for the Contractor's convenience at no cost.

B. Street, stop, and traffic control or direction signs designated for installation, relocation or removal shall be measured and paid for by the number of street, stop and traffic control or direction signs relocated or removed at the unit price bid for the item listed below, which price and payment constitute full compensation for all materials, excavation, temporary and/or permanent installation, forming and curing of concrete, equipment, tools, labor, and incidentals necessary to complete the item. If two or more signs exist on one post, they are defined as one sign for payment purposes.

C. When a sign system is measured by the each, measure each sign system as one sign regardless of the number of sign panels or supports. A sign system includes the supports.

4.3 BENCHES AND INFORMATIONAL SIGNS

A. Benches and informational signs and concrete foundations shall be measured and paid for by the number of units installed, complete in place, at the contract unit price bid which price and payment shall constitute full compensation for all excavation and backfill, furnishing and installing all materials required (concrete, anchor bolts, rebar, etc.), compaction, labor, tools and incidentals necessary to complete the item.

4.4 FENCES AND GATES

A. Reinstall existing fences removed for the Contractor's convenience at no cost.

B. Fences designated for relocation shall be measured and paid for by the lineal foot relocated at the unit price bid for the item listed, which price and payment constitutes full compensation for all materials, excavation, temporary and/or permanent installation, forming and curing of concrete, equipment, tools, labor, and incidentals necessary to complete the item. New fence posts required at the direction of the Engineer will not be paid for separately but will be included in the unit price bid for the item listed below.

C. Installation of new fence shall be measured and paid for by the lineal foot installed at the unit price bid for the item listed, which price and payment constitutes full compensation for all materials, excavation, installation, forming and curing of concrete, equipment, tools, labor, and incidentals necessary to complete the item.

D. Installation of new gates shall be measured and paid for by each gate (single or double) installed at the unit price bid for the item listed, which price and payment constitutes full compensation for all materials (except those materials specifically provided by the owner), excavation, installation, forming and curing of concrete, equipment, tools, labor, and incidentals necessary to complete the item.

4.5 BOLLARDS

A. Bollards will be measured and paid for by the number of units installed, complete in place, at the contract unit price bid which price and payment shall constitute full compensation for all excavation and backfill, furnishing and installing all materials required (concrete, anchor bolts, rebar, etc.), compaction, labor, tools and incidentals necessary to complete the item.

END OF SECTION

SECTION 02230

STREET EXCAVATION, BACKFILL AND COMPACTION

PART I: GENERAL

1.1 DESCRIPTION

A. This work is the clearing and grubbing, excavation, filling or backfilling, and subgrade preparation to the specified lines, grades and cross sections as preparation for overlying base course or other courses as shown in the contract documents. Also included are the removal and disposal of debris and excess soil, the furnishing and placement of fill materials, and compaction.

1.2 REFERENCES

A. The current publications listed below are a part of this specification.

AASHTO T99	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5-lb. (2.5 kg) Rammer and 12-inch (305 mm) Drop
ASTM D698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5-lb. (2.5kg) Rammer and 12-inch (305mm) Drop
AASHTO T191 (ASTM D1556)	Density of Soil In-Place by the Sand-Cone Method
AASHTO T238 (ASTM D2922)	Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)
AASHTO T239 (ASTM D3017)	Moisture Content of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)
AASHTO T11 (ASTM C117)	Materials Finer Than 75mm (No. 200) Sieve in Mineral Aggregates by Washing
AASHTO T27 (ASTM C136)	Sieve Analysis of Fine and Coarse Aggregate
AASHTO T89	Determining the Liquid Limit of Soils
AASHTO T90	Determining the Plastic Limit and Plasticity Index of Soils
ASTM D4318	Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils

1.3 DENSITY CONTROL TESTING

A. Field Density Testing

1. Meeting the quality control and quality assurance testing requirements in Section 01400, Contractor Quality Control and Owner Assurance.

2. In-place field density tests for quality are at Contractor expense meeting AASHTO T191 (ASTM D1556), Sand Cone Method; or AASHTO T310 (ASTM D6938) Nuclear Densometer Methods. Quality assurance field density testing frequency is at the discretion of the Engineer.

3. Retesting of failing areas is at the expense of the Contractor.

B. Laboratory Maximum Density and Optimum Moisture

1. Quality assurance tests will be made by the Contractor's independent testing agency for each on-site natural soil or each source of off-site material, including borrow material, to determine the laboratory maximum density values and optimum compaction moisture content under AASHTO T99 or ASTM D698.

C. Materials Submittals

1. Submit to the Engineer results of gradation tests for Subexcavation/Replacement below subgrade pitrun gravel/sand.

2. Submit to the Engineer upon request, samples of soils and/or aggregates that contain laboratory moisture-density relationship information.

PART 2: PRODUCTS

2.1 ON-SITE EMBANKMENT

A. Fill and backfill are to consist of natural soils free from organic matter, frozen material, refuse, construction debris or other man-made items. Obtain approval of the Engineer for all fill before placing and use only the fill from designated borrow areas.

2.2 IMPORTED BORROW MATERIALS (FOR EMBANKMENTS IN-PLACE)

A. If required, obtain borrow soil for embankments from areas off the project site. Furnish imported borrow at Contractor expense. Obtain Engineer approval of borrow areas. Imported borrow is to meet the requirements of Section 2.1, On-Site Embankment.

2.3 SUBEXCAVATION/REPLACEMENT BELOW SUBGRADE

A. Sub-excavation consists of removing and disposing of unstable material from below planned subgrade elevation in cut sections or from below the natural ground line in embankment sections.

B. Replacement material for subexcavations consists of either:

1. Suitable materials from within the project limits if suitable material is present within the project limits, or

2. Imported materials if suitable material is not present within the project limits. Where imported pitrun gravel is used, furnish replacement material meeting the following gradation requirement:

Sieve Opening	% Passing
3 Inch	100
No. 4	25 - 60
No. 200	12 Max.

PART 3: EXECUTION

3.1 CLEARING AND GRUBBING

A. Perform clearing and grubbing including the excavation, removal and disposal of roots, stumps, sod, or any organic material and buried debris from within construction limits. Remove unsuitable material to at least 12 inches (30cm) below subgrade elevation.

B. Stockpile for project use any topsoil removed by clearing and grubbing.

C. Dispose of all Clearing and Grubbing material as specified.

3.2 EXCAVATIONS STABILITY AND SAFETY

A. Meet OSHA requirements for excavations and excavated material stockpiles. This may require design of temporary slopes and/or shoring by a licensed professional engineer.

3.3 PROTECTION OF PROPERTY

A. Take precautions to protect all adjoining private and public property and facilities, including underground and overhead utilities, curbs, sidewalks, driveways, structures, fences, and vegetation. Any disturbed or damaged facilities will be suitably restored or replaced consistent with conditions(s) which existed prior to construction.

B. Privately owned structures located within the existing right of way and within construction limits of the project shall not be removed until directed by the Engineer. Take care in removing such items so as to minimize the damage to the structures.

3.4 EXCAVATION

A. Excavate to the specified lines and grades. Excavate without causing rutting, pumping or other disturbance to underlying materials.

B. Excavation made outside the specified grade limits is not measured for payment in the Excavation or Embankment In-Place quantities.

1. Restore overexcavated areas as directed by the Engineer. Correct subgrade disturbance by removing the disturbed soil and replacing and compacting to reach at least 95% of the maximum laboratory dry density determined by AASHTO T99 or ASTM D698.

2. Correct subgrade disturbance before placing overlying fill, backfill, base course or other courses. Disturbed soils may be replaced with imported material approved by the Engineer and compacted to 95% of maximum laboratory dry density determined by AASHTO T99 or ASTM D698.

C. Maintain the subgrade to drain at all times. Construct side ditches or gutters from cuts to embankments to prevent erosion damage to embankments.

D. Construct and maintain temporary drainage where existing surface drainage, sewers, or under-drainage are disturbed during the work until permanent drainage facilities are completed. Protect and preserve all existing drains, sewers, sub-surface drains, conduits, gas lines, and other underground structures which may be affected by the work. Repair all damage to these facilities or structures resulting from the work, to the satisfaction of the Engineer.

E. Excavate to minimize foundation and/or subgrade soil exposure to erosion, drying or infiltrating moisture. Perform excavation to provide drainage away from foundation/subgrade soils and minimize the potential for surface runoff to enter the foundation/subgrade soils.

F. Grade all intersecting streets and approaches within the project limits as specified or as directed using suitable materials on the surfaces to produce smooth riding and satisfactory approaches to the intersections.

3.5 DISPOSAL OF EXCAVATED MATERIAL

A. Dispose of debris and unused excavated materials off the project site in accordance with all applicable state and local regulations. Locate and provide suitable disposal areas.

3.6 DUST CONTROL

A. Furnish dust control meeting Section 01500, Construction and Temporary Facilities, requirements.

3.7 SUBGRADE PREPARATION AND COMPACTION

A. General

1. Assure the subgrade beneath pavements, curb, or sidewalks is natural soil free of topsoil, organic material or refuse. Place subbase, base courses, and pavement components, curb and sidewalk over the prepared subgrade as soon as practical. Do not place components on frozen subgrade. No separate payment is made for subgrade preparation, since it is considered incidental to construction of overlying pavements/structures.

2. If the surface of a previous roadbed or pavement surface matches the surface of the finished subgrade, scarify the top 6 inches (15cm) of the previous surface the full width of the subgrade to permit uniform reshaping and compaction.

B. Fine Grading

1. Assure the finished surface does not deviate not more than 0.1 foot (3cm) at any point from the staked elevation; and that sum of the deviations from true grade of any two points less than 30 feet (9m) apart does not exceed 0.1 foot (3cm).

C. Compaction

1. Compact the upper 8-inches (20 cm) of the subgrade to at least 95% of the

laboratory maximum, determined by AASHTO T99 or ASTM D698. Proof roll the subgrade surface for observation by the Engineer. Compact all soft, yielding or otherwise unstable areas to provide adequate support of construction equipment as determined by the Engineer. Also compact the subgrade to meet the specified density requirements. Remove and replace any unstable or otherwise unsuitable subgrade as specified under Section 3.9, Subexcavation/Replacement Below Subgrade.

3.8 EMBANKMENT PLACEMENT AND COMPACTION

A. General

1. Place fill materials (embankment) to the specified lines and grades. Place fill in uniform layers not exceeding 8 inches (20cm) in loose thickness. Once placed, moisten or aerate, mix, and compact each layer as specified. Work clay soils to maximum 2-inch (5cm) nominal size before compacting. Do not begin fill placement until the subgrade construction has been approved by the Engineer. Do not place fill on wet or frozen areas. Do not operate heavy equipment for spreading or compacting fill within four feet (1.2m) of structures.

2. If grading operations are suspended due to weather, blade the entire area until it is smooth, free of depressions and ruts, and crowned to drain water.

B. Compaction

1. Control the fill moisture content to assist in obtaining the specified field density. Maintain the moisture content of fill soils within ±3 percent of optimum moisture. Compact each fill layer and the top 8 inches (20cm) of subgrade soil to at least 95% of maximum laboratory density as determined by AASHTO T99 or ASTM D698. Compact areas within four feet (1.2M) of structures in maximum 8 inch (20cm) loose lifts using power-driven hand held tampers.

2. Apply water, when required, at the locations and in the amounts required to compact the material to the specified requirements. Maintain an adequate water supply during the work. Assure the equipment used for watering is of the capacity and design to provide uniform water application. Apply water during the work to control dust and to maintain all embankment and base courses in a damp condition in accordance with Section 1500. Water required for compacting subgrade and/or embankments may be obtained from the municipal system if approved by the Owner, or from other sources.

3. Do not place fill or embankment when moisture content prevents effective compaction or causes rutting. Dry all embankments having excessive

moisture by scarifying and blading the affected areas before compacting or placing succeeding layers.

3.9 SUBEXCAVATION/REPLACEMENT BELOW SUBGRADE

A. Subexcavation consists of removing and disposing of unsuitable material from below planned subgrade elevation in cut sections or from the natural groundline in embankment sections.

B. Soil is unsuitable if, in the opinion of the Engineer, it contains excessive organics, refuse, construction debris, or other objectionable material; or if it unstable, rutting or yielding; or if it contains excessive moisture. Generally, soils will be subexcavated and replaced only if they are unable to adequately support equipment typically used for excavation and soil transport.

C. Assure the Engineer has measured the area where unstable materials have been removed before backfilling. Do not backfill any area where unstable foundation soils have been excavated until authorized by the Engineer. Backfill placed without approval may be ordered removed and replaced at Contractor expense.

D. Backfill with either suitable soils from within the project limits or imported pitrun gravel complying with the requirements of Section 2.3, Subexcavation/Replacement Below Subgrade. Different measurement and payment items are used for the on-site and pitrun gravel replacements.

E. Compact the replacement material to 95 percent of the maximum laboratory density as determined by AASHTO T99 or ASTM D698.

3.10 PROTECTION OF THE WORK

A. Repair damaged embankments to the specified elevations and grades. Maintain ditches and drains along the subgrade to drain the subgrade. Assure the finished grade does not deviate more than 0.1 (3cm) foot at any point from the staked elevation and the sum of the elevations from true grade of any two points not more than 30 feet (9m) apart does not exceed 0.1 foot (3cm). Do not place any surface course or pavement until the subgrade has been checked and approved by the Engineer.

PART 4: MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. EXCAVATION ABOVE SUBGRADE

1. Measure excavation by the cubic yard in its original position. Payment for excavation will be according to the designed quantities as shown in

the bid schedule unless it is determined by the contractor and verified by the Engineer that errors exist in the original design that cause the pay item quantity to change by 10 percent or more. This item includes all labor, tools, equipment, and other incidentals necessary to excavate material above subgrade in its original position, haul, place, level, manipulate, compact the embankment material in its final position, and perform other incidental work required for excavation and embankment construction. Payment is made under: Road, Trail, and Parking Excavation.

B. SUBEXCAVATION/REPLACEMENT BELOW SUBGRADE

1. This item is field measured using the average end area method and paid for by the cubic yard (cubic meter) in-place of material removed, measured in its original position, at a unit price mutually agreed upon between the Owner and the Contractor for Subexcavation/Replacement Below Subgrade, which price and payment constitutes full compensation for all labor, equipment, tools, and incidentals to complete the excavation and disposal of unsuitable material in the embankment foundation or in the subgrade. The cost of backfilling and compacting holes created by the removal of unsuitable material with the specified replacement material is also included in Subexcavation/Replacement Below Subgrade Item. Payment for this work will be made under SECTION 01800 MISCELLANEOUS WORK.

C. EMBANKMENT IN PLACE

1. Embankment in place will not be measured for payment. All embankment construction that is required for this project will be considered incidental to roadway excavation. Quantities of embankment shown on the drawings are for information only and are only approximate.

C. Temporary Construction Access Road

1. Construction of the Temporary Construction Access Road will not be measured for payment. Payment includes compensation for all work associated with providing and placing embankment material, road surfacing, drainage culvert, safety fencing and gates, removal of access road materials, site restoration, and all other materials, labor, tools, and incidentals required to complete the work.

END OF SECTION

SECTION 02528

CONCRETE CURB

PART 1: GENERAL

1.1 DESCRIPTION

A. This work is constructing combined curb and gutter, ribbon curb, and concrete drain using structural concrete and meeting the lines, dimensions, and grades shown on the plans and these specifications.

1.2 REFERENCES

AASHTO M 213	Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
AASHTO M148	Standard Specification for Liquid-Forming Compounds for Curing Concrete

PART 2: PRODUCTS

2.1 STRUCTURAL CONCRETE

A. Furnish structural concrete meeting the requirements of Section 03310, STRUCTURAL CONCRETE.

2.2 PRE-FORMED EXPANSION JOINT MATERIAL

A. Furnish joint material meeting the requirements of AASHTO M213.

2.3 GRAVEL BASE MATERIAL

A. Furnish gravel base meeting all applicable portions of Section 02235, CRUSHED BASE COURSE, and meeting gradation requirements for 3/4" minus material.

2.4 CURING AND PROTECTIVE COATING MATERIALS

A. Liquid Membrane-Forming Compounds for Curing Concrete

1. Furnish liquid membrane-forming compound meeting the requirements of AASHTO M148, Type 1, clear or translucent.

B. Emulsified Linseed Oil Compound

1. Assure it meets all requirements of AASHTO M148 and contains at least

2.7 pounds (0.32 kg) of linseed oil per gallon (liter). Furnish a manufacturer's certification showing that the formulated weight of linseed oil per gallon equals or exceeds this limit.

PART 3: EXECUTION

3.1 GENERAL

A. Concrete curb and gutter may be machine-laid or hand-formed. Perform work meeting these requirements and the applicable requirements of Section 03310, STRUCTURAL CONCRETE.

3.2 FOUNDATION PREPARATION

A. Excavate the foundation to the specified depth. Assure the subgrade or base course for the concrete has a firm and even surface and is compacted meeting Section 02230, STREET EXCAVATION, BACKFILL, AND COMPACTION.

B. Complete excavation to the lines shown in the contract documents.

C. Place at least 4 inches of crushed base course material and compact it to a firm, even surface under all curb and gutter. This requirement is waived if curb and gutter is installed on a portion of street base course material of 4 inches or more in thickness.

D. For new street construction or street reconstructing place gravel base course for the street to the back of the curb.

3.3 FORMS

A. Use metal forms unless otherwise approved of the depth equal to the face of the item being constructed. Obtain Engineer approval of in-place forms before placing concrete.

B. Assure forms produce the shape, lines, and dimensions shown on the plans and/or drawings. Assure forms prevent leakage of mortar and maintain position and alignment. Thoroughly clean and oil before placing and do not remove forms until the concrete has hardened sufficiently to prevent damage.

C. Where the curb and gutter is to abut an existing sidewalk, use an approved face-of-gutter form secured to maintain an established gutter grade. Vary the curb height to assure the top of curb matches as nearly as possible the standard curb and gutter cross section. Obtain Engineer approval to hand form lengths not exceeding 10 feet (3m).

D. Form radii using flexible or curved metal forms set to fit the specified curvature.

Obtain Engineer approval before using wood forms. Radii may be formed by using segments of straight forms if the length of the straight segment does not exceed one-tenth of the length of the radius.

3.4 REINFORCEMENT

A. Place reinforcement as required. Place and hold in position before placing concrete.

3.5 PLACING CONCRETE

A. Place and compact the gravel base material to the specified grade before placing concrete. Dampen the gravel base material just before placing the concrete. Spade and tamp the concrete thoroughly into the forms to provide a dense, compacted concrete free of rock pockets. Float, finish, and broom the exposed surfaces. Each placing/finishing crew shall have at least one ACI Flatwork Finishing Technician, or approved equivalent, on site at all times.

B. Do not place concrete at a rate that exceeds the finishing operation's ability to meet these specifications.

C. Machines or equipment that extrude curb and gutter may be used when approved, provided they produce a finished product matching that obtained by the set-form method. Use slip-form machines that are automatically controlled for longitudinal grade, alignment, and transverse slope by sending devices operating from string lines set from construction stakes placed by the Engineer.

3.6 STRIPPING FORMS AND FINISHING

A. Forms

1. Remove forms when the concrete is sufficiently set to prevent chipping or spalling. When forms are removed before the curing period has expired, protect the concrete edges with moist earth or spray edges with curing compound. Clean, oil, and examine all forms for defects before they are used again.

B. Finishing

1. Finish the surface of concrete curbs and gutters true to the lines and grades shown on the plans.

2. Fill honeycomb or other blemishes in formed surfaces with grout to the specified finish. Tool all edges to a ¼-inch (6.4 mm) radius. Float the surface using a magnesium float to a smooth and uniform surface. When the concrete in the curb and gutter has hardened sufficiently, give the surface a broom finish. Obtain Engineer approval of the broom before

use. Broom the surface without tearing the concrete. Broom to produce regular corrugations not exceeding 1/8-inch (3.2 mm) deep.

C. Crew

1. Do not apply additional surface water. The Engineer may permit adding water, but it must be applied by fog spray only. Use of an evaporation retardant, Confilm, or equal, following the manufacturer's directions is permitted.

3.7 CURING

A. Curing meeting Section 03310, STRUCTURAL CONCRETE, requirements.

3.8 JOINTS

A. Place curb and gutter monolithically with no construction joints permitted, except at planned expansion joints.

B. Construction expansion joints at radius points, construction joints, junctions with existing concrete, opposite to or at expansion joints in adjacent concrete, and at maximum 330-foot (92 m) intervals, in a continuous run of concrete being placed. Form expansion joints using ½-inch (12.7 mm) thick, pre-formed expansion joint filler, as specified in Section 02528.2.2.

C. Form or cut contraction joints 1/8-inch (3.2 mm) wide to one-fourth the depth of the concrete being placed. Construct the joints to coincide with the joints in adjacent concrete or in uniform sections 10 feet (3 m) in length. Where required to make a closure, sections less than 10 feet (3 m) in length will be permitted with the minimum length being 4 feet (1.2 m). When contraction joints are made by approved forming or grooving before the concrete has set, tool the edges to the approved radius.

3.9 CURB BACKFILL

A. Complete the curb backfill to 4 inches (10 cm) below the top of curb before final grading of the subgrade and placing the base course.

B. Backfill using topsoil up to 4 inches (10 cm) below top of curb. Do not use sand or gravel backfill in this area.

C. In areas of existing lawns or constructed boulevards, use black loam or approved topsoil for the top 4 inches (10 cm) of backfill. Place it out from the curb and in the amount required to replace the turf or lawn removed during installation. Place the backfill to a point level with the top of the curb, immediately adjacent to the curb, and grade and blend to match the existing undisturbed lawn area.

D. Where lawns do not exist, place the top 4 inches (10 cm) of backfill using impervious dirt and conforming to the typical sections shown on the plans.

E. Compact backfill to prevent settlement and level the surface to be free draining.

3.10 PRIME AND SEAL COAT PREPARATION

A. Paint the edge of the gutter adjacent to the asphalt surfacing with an asphalt prime coat before placing the pavement surface course. When an asphalt seal coat is specified, apply the oil and cover aggregate 3 inches (7.6 cm) on to the gutter to provide a good seal on the joint between the concrete and pavement.

3.11 TOLERANCES

A. Perform the work to produce a curb and gutter meeting the specified line and grade uniform in appearance and structurally sound. Remove and replace at contractor expense curb and gutter having unsightly bulges, ridges, and/or low spots in the gutter, or other defects as directed. Grade cannot deviate more than 1/8-inch (3.2 mm), and alignment not vary more than ¼-inch (6.4 cm) from plan elevation, grade or alignment. Tolerances may be checked using survey instruments, straight edges, or water puddling. Puddled water cannot exceed ¼-inch (6.4 mm) in depth.

PART 4: MEASUREMENT AND PAYMENT

4.1 COMBINED CONCRETE CURB AND GUTTER

A. This item is measured and paid for by the lineal feet of combined curb and gutter in place at the contract unit price bid. Price and payment is full compensation for all materials, furnishing and placing crushed base course, curing of concrete, painting face gutter with primer, all pre-molded mastic material for expansion joints, contraction joints, steel dowels and sleeves, all equipment, tools, labor, and for the performance of all work and incidentals necessary to complete the item. The lineal feet (meter) measurement is the horizontal distance measured along the face of the curb.

4.2 COMBINED CONCRETE RIBBON CURB

A. This item is measured and paid for by the lineal feet of ribbon curb in place at the contract unit price bid. Price and payment is full compensation for all materials, furnishing and placing crushed base course, curing of concrete, painting face gutter with primer, all pre-molded mastic material for expansion joints, contraction joints, steel dowels and sleeves, all equipment, tools, labor, and for the performance of all work and incidentals necessary to complete the item. The lineal feet (meter) measurement is the horizontal distance measured along the front edge of the curb.

4.3 CONCRETE DRAIN

A. This item is measured and paid for by the lineal feet of concrete drain in place at the contract unit price bid. Price and payment is full compensation for all materials, treatment of concrete, all equipment, tools, labor, and for the performance of all work and incidentals necessary to complete the item. The lineal feet measurement is the horizontal distance measured along the bottom of the ditch.

END OF SECTION

SECTION 03310

STRUCTURAL CONCRETE

PART 1: GENERAL

1.1 DESCRIPTION

A. Furnish structural concrete meeting all specified requirements that is composed of Portland cement, aggregates, water. Furnish Ready-mixed concrete meeting ASTM C94 unless otherwise specified.

1.2 REFERENCES

ASTM C-94	Standard Specification for Ready-Mixed Concrete
ASTM C-150	Specification for Portland Cement
ASTM C-618	Specification for Coal Flyash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C-989	Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM C-595	Specification for Blended Hydraulic Cements
ASTM C-157	Performance Specification for Hydraulic Cements
ASTM C-33	Specification for Concrete Aggregates
ASTM C-260	Specification for Air-Entraining Admixtures for Concrete
ASTM C-494	Specification for Chemical Admixtures for Concrete
ASTM C-1017	Specification for Chemical Admixtures for Use in producing Flowing Concrete
ASTM D-98	
ASTM C-138	Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C-173	Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C-231	Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C-31	Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C-39	Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C-172	Practice for Sampling Freshly Mixed Concrete
ACI 301	Standard Specification for Structural Concrete for Buildings
ACI 305	Hot Weather Concrete
ACI 306	Cold Weather Concrete
ACI 318	Building Code Requirements for Reinforced Concrete

1.3 QUALITY ASSURANCE

A. Codes and Standards: The codes and standards referred to in this section are declared to be part of this specification as if fully set forth herein. In addition, the following ACI Standards are incorporated in their entirety, unless specifically required otherwise:

1. ACI Standard 301, "Specifications for Structural Concrete for Buildings," American Concrete Institute, Edition.

2. ACI Standard 318, "Building Code Requirements for Reinforced Concrete", American Concrete Institute, current edition.

3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

4. International Building Code of I.C.B.O.

B. Concrete Testing: The Contractor shall employ at his expense an independent testing agency acceptable to the engineer to perform material evaluation tests and/or perform the mix design prior to placing any concrete. The independent testing agency will perform all acceptance testing during the onsite placement of the concrete. Retesting or additional testing of concrete or materials failing to meet the requirements of these specifications shall be done by the Contractor at no additional cost to the Owner.

PART 2: PRODUCT

2.1 CLASSIFICATION

A. Concrete is classified as set forth below. Place the specified class of concrete for each structure element as specified. Concrete with prefixes "C" contain 1-1/2 inch (38.1 mm) size aggregate and those with "M" contain 3/4 inch size aggregate. Concrete with prefixes "M" may be substituted for concrete with prefixes "C". *Unless otherwise noted in the Contract Documents, all concrete shall be M-4000.*

1. Use M-4000 concrete for curb and gutter, sidewalks, driveways, approaches, curb turn fillets and valley gutters and structural concrete.

2. Use M-3000 concrete for manholes, storm drain inlets and miscellaneous or C-3000 Concrete Construction class.

3. M-3000 is concrete with 3/4 inch maximum aggregate and a 28-day compressive strength of 3000 pounds per square inch (psi).

4. M-4000 is concrete with 3/4 inch maximum aggregate and a 28-day compressive strength of 4000 pounds per square inch (psi).

5. C-3000 is concrete with 1-1/2 inch maximum aggregate and a 28-day compressive strength of 3000 psi.

B. If concrete strength or durability requirements established by design exceed the above strength classifications, the Engineer may specify additional concrete classifications to meet those requirements.

2.2 COMPOSITION OF CONCRETE

A. Upon receipt of the notice of award of the contract, furnish the Engineer with names of suppliers and locations of sources of materials proposed for use.

1. Materials

a. Cementitious Material: Cementitious material consists of Portland cement meeting ASTM C 150, with or without the addition of cementitious or pozzolanic mineral admixtures meeting, ASTM C618 or ASTM C989, or blended hydraulic cement meeting ASTM C595 or ASTM 1157. Unless otherwise specified, assure cementitious material meets ASTM C 150 Type I or Type II. Assure cementitious material used in concrete is the same brand and type and from the same plant of manufacture as the cementitious material used in the concrete represented by the submitted field test date or used in the trial mixtures.

b. Aggregates: Assure aggregates meet ASTM C33. When a single size or a combination of two or more sizes of coarse aggregates are used, assure the final gradation meets the grading requirements of ASTM C33. Obtain concrete aggregates from the same source and use the same size ranges as the aggregates used in the concrete represented by submitted historical data, or used in trial mixtures.

c. Water and Ice: Use concrete mixing water and water to make ice meeting requirements of ASTM C94.

d. Admixtures: Use admixtures meeting the following requirements:

1) Air entraining, admixtures - ASTM C260
2) Chemical admixtures - ASTM C494
3) Chemical admixtures for use in producing, flowing concrete - ASTM C1017

4) Calcium Chloride - ASTM D98

5) Use admixtures in the concrete that are the same as those used in the concrete represented by submitted field test data or in trial mixtures.

2. Change of materials

a. When brand, type, size, or source of cementitious materials, aggregates, water, ice or admixtures are requested to be changed, submit new field data or data from new trial mixtures or furnish evidence that indicates that the change will not adversely affect the relevant properties of the concrete for acceptance before using the concrete.

B. Performance and Design Requirements

1. Assure the cementitious material content is adequate to meet the specified requirements for strength, water-cement ratio and finishing requirements. For concrete used in floors, assure the cement content is at least that indicated in Table 2.1. Acceptance of a lower cement content is contingent upon verification that concrete mixtures with a lower cement content will meet the specified strength requirements and will produce concrete with equal finish quality, appearance, durability, and surface hardness. When a history of finishing quality is not available, evaluate the proposed mixture by placing concrete in a slab at the job using job materials, equipment and personnel. Assure the slab is at least 8 feet (2. m) square and has an approved thickness. Slump cannot exceed the specified slump. Submit evaluation results for acceptance.

TABLE 2.1
MINIMUM CEMENT CONTENT REQUIREMENTS

Nominal Maximum size of aggregate, in (mm)	Minimum cement content lb/yd3 (kg/m3)
1-1/2 (38-1)	470* (163.0)
1 (25.4)	520 (180.3)
3/4 (19-05)	540 (187-3)
3/8 (9-5)	641 (222.3)

* Minimum cement content is 520 lb/yd^3 and maximum H2O/cement ratio of 0.45 if concrete will be exposed to freezing and thawing and/or in the presence of deicing chemicals.

2. Furnish concrete at the point of delivery having a slump of 4 inches (max) determined by ASTM C 143. Meet slump tolerances in ACI 117. When a plasticizing admixture is used meeting ASTM C 10 17 or when a Type F

or G high range water reducing admixture meeting ASTM C494 is approved to increase the concrete slump, assure the concrete has a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

3. Assure the nominal maximum size of coarse aggregate does not exceed three fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms or one-third of the thickness of slabs or toppings.

4. Concrete must be air entrained. Measure air content under ASTM C 138, C 173 or C231. Unless otherwise specified, ASTM C231 shall be used.

TABLE 2.2
TOTAL AIR CONTENT* OF CONCRETE
FOR VARIOUS SIZES OF COARSE AGGREGATE

	Total air content, percent		
Nominal maximum Size of aggregate mm, (in.)	Severe exposure	Moderate exposure	Mild exposure
Less Than 9.53 (3/8)	9	7	8
9.53 (3.8)	7.5	6	4.5
12.7 (½)	7	5.5	4
19-05 (3/4)	6	5	3.5
25.4 (1)	6	4.5	3
12.7 (1-1/2)	5.5	4.5	3
50.8 (2)	5	3.5	1.5
76.2 (3)	4.5	3.5	1.5
152.4 (6)	4	3	1

* Measure in accordance with ASTM C 138, C 173, or C 231.
Air content tolerance is +/- 1 - 1 ½ percent

a. When admixtures are specified in the Contract documents for particular parts of the work, use types specified. Use of calcium chloride or other admixtures containing chloride ions is subject to the limitations in Table 2.3 Chloride Ion Concentration. When approved, use calcium chloride in solution form only, when introduced into the mixture.

1) Assure the maximum water soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days attributed to the ingredients including water, aggregates, cementitious materials and admixtures do not exceed the limits of Table 2.3. Use tests to determine water soluble chloride ion content meeting AASHTO T260. The

type of member described in Table 2.3 applies to the work as indicated in the Contract Documents.

TABLE 2.3
MAXIMUM ALLOWABLE CHLORIDE ION CONTENT

Type of Member	Maximum water soluble chloride (CI) Content in concrete, percent by weight of cement
Prestressed concrete	0.06
Reinforced concrete exposed to chloride in service	0.15
Reinforced concrete that will be dry or protected from moisture in service	1.00
Other reinforced concrete construction	.30

b. When the average of the highest and lowest temperature during the period from midnight to midnight is expected to drop below 40°F (40°C) for more than three successive days, deliver concrete in accordance with ASTM C-94.

c. Furnish the compressive strength and the water-cement or water cementitious, material ratio of concrete for each portion of the work as specified in the Contract documents.

1) If cementitious or pozzolanic mineral admixtures meeting, ASTM C618 or ASTM C989 are used, the cement portion of the water-cement ratio must be the total weight of cementitious material.

2) The maximum weight of fly ash, pozzolan or ground granulated blast-furnace slag included in the calculation of water-cementitious material ratio cannot exceed the following percentages of the total weight of Portland cement plus fly ash, pozzolan and ground granulated blast-furnace slag:

3) The combined weight of fly ash and pozzolan meeting ASTM C618 cannot exceed limits in ACI 318. The fly ash and pozzolan present in an ASTM Type IP or IPM blended cement meeting ASTM C595 must be included in the calculated percentage.

4) The weight of ground granulated blast-furnace slag meeting ASTM C989 cannot exceed 50 percent of the total weight

of cementitious material. The slag used in manufacture of a Type IS or ISM blended hydraulic cement meeting ASTM C595 must be included in the calculated percentage.

5) If fly ash or pozzolan is used in concrete with ground granulated blast-furnace slag, the Portland cement constituent meeting ASTM C 150 cannot be less than 50 percent of the total weight of cementitious material. Fly ash or pozzolan must not constitute more than 25 percent of the total weight of cementitious material.

6) Strength requirements are based on the 28-day compressive strength determined on 6" x 12" (150mm x 300mm) cylindrical specimens made and tested under ASTM C31 and C39 respectively.

2.3 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to the Engineer for preparing and reporting proposed mix designs.

B. Submit written reports of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and approved.

2.4 REINFORCING STEEL

A. Provide reinforcing steel as specified in Section 03210 – Reinforcing Steel

PART 3: EXECUTION

3.1 CONCRETE MIXES

A. Job-Site Mixing: Mix materials for concrete in appropriate drum type batch match mixer. For mixers of one cu. Yd., or small capacity continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cubic yard, increase minimum 1-1/2 minutes of mixing time by 2.5 minutes for each additional cu. yd., or fraction thereof.

B. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, batch quantities, and amount of water introduced.

C. Ready-Mix Concrete: Comply with requirements of ASTM C94, and as herein specified.

D. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ANSI/ASTM C94 may be required.

E. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.

3.2 CONSISTENCY

A. Assure concrete is of such consistency that it will flow around reinforcing steel, but individual particles of the coarse aggregate, when isolated, show a coating of mortar containing its proportionate quantity of sand. The consistency of the concrete will be gauged by the ability of the equipment to properly place the concrete in its final position and not by the difficulty in mixing or transporting. Use the minimum quantity of mixing water necessary to provide workability within the ranges of slump specified.

3.3 MIXING

A. Thoroughly mix concrete to assure a uniform distribution of the materials throughout the mass. Mix concrete only in quantities required for immediate use and place it within the time limits specified. Waste all concrete which initial set has begun. Retempering of concrete is prohibited. Aggregates, or bags of cement containing lumps or crusts of hardened material shall not be used. Mix Concrete in an approved truck mixer meeting the requirements of ASTM C94 herein.

B. The capacity of the plant and the transportation equipment must ensure delivery at a rate that will permit proper handling, placement and finishing at the point of delivery. Maintain the concrete delivery rate to provide for the continuous operation of placing, handling and finishing concrete as is practical. Maintain the interval between delivery of loads so that layers or lifts of concrete in place do not harden before succeeding layers or lifts are placed. In general, no lift or layer of concrete can remain exposed for more than 20 minutes before being covered by fresh concrete.

C. The volume of mixed concrete in the mixing drum shall not exceed the manufacturer’s rating, on the capacity plate.

D. During freezing weather, other approved methods of measuring water will be permitted.

E. A recording water metering device is always required at the primary point of the batching operation.

F. Do not add water to concrete in transit. Water may be introduced into the mixer at the job site under direction of the Engineer, if the specified water-cement ratio is not exceeded. Water must be added in accordance with ASTM C94. Assure the drum revolves continuously after the introduction of the cement and water until the concrete is discharged.

G. Begin mixing immediately after introduction of the cement and water and continue for at least 70 revolutions of the drum at mixing speed. This minimum revolution count will be waived when the concrete is produced at a central mixing plant. Not more than 100 drum revolutions can exceed 6 revolutions per minute. All other revolutions must be at agitating speed of not less than 2 or more than 6 revolutions per minute.

H. Discharge the concrete at the job and place in its final position within 1 - ½ hours after the introduction of the mixing water and cement. When the air temperature is 90°F (30°C) or above, place the concrete in its final position within 1 hour after the introduction of the mixing, water and cement. Concrete mixes with an approved set retarding admixture may be held an additional ½ hour beyond limits specified above.

I. No mixed or agitated concrete that has remained in the drum of the truck mixer more than 10 minutes without agitation can be used. If the Engineer determines the concrete has not suffered any detrimental effects. It may be used, after remixing for a minimum of 20 revolutions of the drum at mixing speed, if it can still be placed in the forms within the specified time limits.

J. Provide a revolution counter on each truck that registers the number of revolutions of the drum.

K. Mount the counter so it can be easily read by both the operator and the Engineer.

3.4 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.6 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.7 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

3.8 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Contracting Officer.

3.9 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 CURING CONCRETE

A. Thoroughly cure concrete surfaces subject to premature drying by covering as soon as possible with canvas, plastic sheets with sealed joints, burlap and sand or other satisfactory materials and keep concrete moist. If the concrete surfaces are not covered, keep them moist by flushing or sprinkling. Continue curing for at least 7 days after placing the concrete. Concrete surfaces placed against forms may be cured by leaving the forms in place for at least 7 days, when approved.

B. Protect concrete against freezing or other conditions detrimental to strength development meeting the applicable requirements of this specification.

C. To aid finishing, side forms on ornamental work, curbs and sidewalks, railing and parapets may be removed after 12 hours, not to exceed 48 hours, depending on weather conditions. Continue moist curing during the concrete finishing operation.

D. Untreated forms and existing concrete must be kept continuously wet for at least 1 hour before any concrete is placed. Keep wet until covered with concrete except that adequately treated forms must be thoroughly washed with a water spray immediately before placing the concrete.

E. The curing of concrete, by either water curing or membrane curing, must be as follows unless otherwise approved by the Engineer.

1. Water Curing

a. Keep all concrete top surfaces continuously moist after finishing, with a fine water spray, until the concrete has set. Cover the moist concrete with water or an approved curing covering.

b. Cure concrete deck slabs and concrete floors for at least 7 days. Cure by placing burlap, cotton mats or other absorptive material as close behind the finishing operation as possible without marring the finished surface. Keep the absorptive material continuously moist for the full time it is used. The absorptive material may be

kept in place for the entire curing period or it may be removed as soon as practical and the entire surface covered with approximately 1-1/2 inches (38.1 mm) of sand, kept continuously moist for the entire curing period.

c. Remove forms and repair surface irregularities without interfering with any of the curing requirements. As soon as the vertical forms have been removed and the surface irregularities repaired, cover the concrete with absorptive material, kept continuously wet for the balance of the curing a period.

2. Impervious Membrane Curing

a. Assure membrane curing compounds are delivered to the job in the manufacturer's original container, clearly labeled to show the name of the manufacturer and the contents. The clear curing compound must be sufficiently transparent and free from permanent color that would change the color of the natural concrete. Use clear compound containing a fugitive dye having color sufficient to render the film visible on the concrete for at least 4 hours after application. The concrete surface must maintain its natural color after curing.

b. Use a compound ready for use as shipped by the manufacturer. Dilute following the manufacturer's recommendations. Use curing compound only with written approval. Sampling will not be required if manufacturer's certification is available. Apply the curing compound under pressure with a spray nozzle to cover the entire exposed surface thoroughly and completely with a uniform film not exceeding manufacturer's specifications. Maintain the required pressure in the spray machine to force the material to leave the nozzle in a fine mist. Keep all concrete surfaces moist with a fine water spray or with wetted burlap until the sealing compound is applied. Keep the curing compound application close to the finishers of the top surface of concrete at all times. Seal the concrete immediately after the finishing operations have been completed, to the satisfaction of the Engineer.

c. If it is necessary to allow workers or equipment on the surface before the 7 day curing period is completed, cover the top surface of sealed concrete with a protective cushion for runways. Use a cushion consisting of a moist, 1-inch (25mm) minimum thick layer of fine sand, or layers of moist burlap that will prevent damage to the finished concrete. Cover the approved cushion with four by eight foot sheets of 3/4 inch (19mm) plywood laid over the cushion.

Do not place the cushion material for at least 8 hours after the final application of the curing compound. Obtain the Engineer's written approval for any other proposed cushion material before use. Layers of plastic, visqueen or canvas are not an acceptable cushion material.

d. Keep concrete, which has not completed its curing period, continuously moist during the stripping and surface repair operations. Remove all surface irregularities, repair all depressions, voids or holes, including those formed by trapped air, to the satisfaction of the Engineer. Immediately apply the curing compound before the surface has had an opportunity to dry out. Keep concrete, from which forms have been stripped, continuously moist until surface repair and finishing are completed and the impervious membrane curing has been applied.

3.12 WEATHER AND NIGHT LIMITATIONS

A. General

1. Stop concreting operations when darkness prevents obtaining the specified placing, and finishing work. Night operations may be conducted with written approval and when approved artificial lighting is provided.

2. Cold weather concreting is governed by ACI 306 unless otherwise specified herein. Hot weather concreting methods is governed by ACI 305 unless otherwise specified herein. Except by specific written authorization, stop concreting operations when a descending air temperature in the shade and away from artificial heat falls below 40°F (4°C), or do not resume until an ascending air temperature in the shade and away from artificial heat reaches frozen foundation course or subgrade.

3. Assume all risk of placing concrete in cold weather. Placing concrete during cold weather does not relieve the Contractor of the responsibility for obtaining the specified results. Remove and replace all concrete injured by frost at Contractor expense.

4. Before any concrete is placed, remove all ice, snow and frost completely from the formwork receiving the concrete.

5. Heating and Placing Concrete

   a. When concreting is authorized during cold weather, assure concrete temperature meets ASTM C94.

6. Protection of Concrete

a. During the curing period, if the air temperature is anticipated to fall below 32°F (0°C), provide an approved blanket type insulating material along the work for covering all concrete that has been in place for 7 days or less. If, at any time, the ambient temperature drops to 32°F (0°C) or less, protect the concrete using a method approved by the Engineer. The minimum method of protection under such conditions is as follows: between two layers of plastic sheeting, the insulating materials, with the exception of commercial blankets, must be spread loosely to a minimum depth of 6 inches (150mm), but in all cases, to the depth required to prevent freezing of, or frost damage to, the concrete. Maintain the blanketing material at least until the end of the regular specified curing, period which is not less than 7 days. The Engineer may direct leaving the blanketing material in place for an additional period if the recorded temperatures indicate that additional curing may be necessary. If during the construction period the mean daily temperature is expected to fall below 40°F (4°C) for 3 consecutive days, furnish approved heating enclosures and devices capable of maintaining the surface temperature of the concrete in place between 55°F (13°C) and 80°F (26°C). The curing, period under these conditions is 7 days when Type I-II cement is used and 5 days when a pre-approved "high early strength" mix is used. At the close of the curing period, the heat may be reduced so that the temperature inside the housing does not decrease faster than 15° per hour until the temperature inside the housing is the same as outside.

b. A Contractor may, at their own expense, field cure concrete cylinders with their in-place concrete and discontinue protection when those field cylinders reach 70 percent of design strength as indicated by the 28 day requirement of these specifications.

c. Perform all concrete protection using methods consistent with ACI-306-1-87 and approved by the Engineer.

3.13 TESTING

A. All concrete must be tested by an ACI Grade I or equivalent certified testing technician.

1. Materials

a. The Engineer or their representative must have access to the ready mix production facility for sampling constituent materials during production to assure the materials meet these specifications and represent those stated on the approved mix design.

2. Standard Slump Tests

   a. A slump test will be made each time that strength specimens are made. Slump tests are performed meeting ASTM C143 "Method of Test for the Slump of Portland Cement Concrete".

3. Compression Tests

   a. A minimum of three specimens 6 inch (150 m) in diameter, shall be made and tested for every concrete placement. Mold and test one set of test cylinders for every 50 yards (76.5 cubic meters) of concrete or fraction thereof placed each day. On a given project, if the total volume of concrete is such that frequency of testing required above would generate less than 5 strength tests for a given class of concrete, make tests from at least 5 randomly selected batches or from each batch if fewer than 5 batches are used. Cure these cylinders under laboratory conditions except that additional test cylinders cured entirely under field conditions may be required by the Engineer to check the adequacy of curing and protection of the concrete.

   b. Take samples for strength tests in accordance with ASTM C172, entitled *"Practice for Sampling Freshly Mixed Concrete"*.

   c. Mold test cylinders and laboratory-cure in accordance with ASTM C31. Test cylinders in accordance with ASTM C39, entitled "Method of Test for Compressive Strength of Cylindrical Concrete Specimens", ASTM C39, using an independent testing laboratory, as approved by the Engineer.

   d. Of each of the 3 cylinders take for a pour, test 1 for information strength at 7 days and test 2 for acceptance strength at 28 days. To meet this specification, average strength of two cylinders from the same sample, tested at 28 days or the specified earlier age, is required for each strength test. Strength level of an individual class of concrete is considered satisfactory if both of the following requirements are met:

      1) The average of all sets of 3 consecutive tests equal or exceed the specified strength.
      2) No individual strength test (average of two cylinders) falls below specified strength by more than 500 psi (3400 kPa).

   e. Cure field cured cylinders under field conditions meeting Section 7.4 of "Method of Making and Curing Concrete Test Specimens in the Field" (ASTM C31).

f. Mold field cured test cylinders at the same time and from the same samples as laboratory cured test cylinders. Improve procedures for protecting and curing concrete when strength of field cured cylinders at the test age designated for measuring specified strength is less than 85 percent of that of companion laboratory cured cylinders. When laboratory cured cylinder strengths are appreciably higher than the specified strength, field cured cylinder strengths need not exceed the specified strength by more than 500 psi even though the 85 percent criterion is met.

g. The strengths of any specimens cured on the job are to indicate the adequacy of protection and curing of the concrete and may be used to determine when the forms may be stripped, shoring removed or the structure placed in service. When the strengths of the job cured specimens are below those specified above, the Contractor must improve the procedures for protecting and curing the concrete.

h. When concrete fails to meet the requirements above or when tests of field cured cylinders indicate deficiencies in protection and curing, the Owner's representative may order tests on the hardened concrete under Chapter 17.3 of ACI-301-84 or order load tests in Chapter 20 of the ACI Building Code (ACI 318-83) for that portion of the structure where the questionable concrete has been placed. In the event the load or core tests indicate that the structure is unsatisfactory, make all modifications as directed by the Engineer to make the structure sound. If the load or core tests indicate the concrete is satisfactory, all cost of testing shall be paid by Owner.

4. Air Content Tests

a. The Engineer shall during each strength test, check the air content by either the "Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method" (ASTM C231), "Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method" (ASTM C173) or "Method of Test for Unit Weight, Yield and Air Content (Gravimetric) of Concrete" (ASTM C138).

5. Temperature

a. Test hourly when air temperature is 40°F (4°C) and below, and when 80°F (27°C) and above; and each time a set of compression test specimens is made.

PART 4: MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Structural concrete used in the work is not measured separately for payment. The cost of furnishing and placing structural concrete is incidental and included in the unit price or lump sum price bid for other items of the work.

4.1 REINFORCED CONCRETE WALL

A. The Reinforced Concrete Wall will not be measured for payment, but will be paid for at the contract quantity, complete in place. Payment is full compensation for all materials, labor, tools, and incidentals required to complete the work prescribed in the section and in the contract documents.

END OF SECTION

SECTION 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
    1. Structural steel.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural support indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 COORDINATION

A. Coordinate installation of anchorage items to be attached to other construction without delaying the Work. Provide setting diagrams, instructions, and directions for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings: Show fabrication of structural-steel components.
    1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
    2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
    3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts.
C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
    1. Power source (constant current or constant voltage).
    2. Electrode manufacturer and trade name, for demand critical welds.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.
B. Mill test reports for structural steel, including chemical and physical properties.

C. Product Test Reports: For the following:
    1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
D. Survey of existing conditions.
E. Source quality-control reports.
F. Field quality-control and special inspection reports.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC QMS Certification Program and is designated an AISC-Certified Plant, Category BU.
B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
C. Comply with applicable provisions of the following specifications and documents:
    1. AISC 303.
    2. AISC 341 and AISC 341s1.
    3. AISC 360.
    4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
    1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
    1. Fasteners may be repackaged provided Contracting Officer's testing and inspecting agency observes repackaging and seals containers.
    2. Clean and relubricate bolts and nuts that become dry or rusty before use.
    3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Provide structural steel materials that conform to ASTM A572, Grade 50

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

2.3 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
    1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
C. Bolt Holes: Cut, drill,or punch standard bolt holes perpendicular to metal surfaces.
D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."
F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
    1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
    2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
    3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.4 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
    1. Joint Type: Snug tightened.
B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
    1. Assemble and weld built-up sections by methods that maintain true alignment of axes
    without exceeding tolerances in AISC 303 for mill material.

2.5 GALVANIZING

A. Hot-dip galvanize all steel members according to ASTM A 123. Provide coating Grade 100 (3.9 mils, 2.3 oz./SF) or Grade 85 (3.3 mils, 2.0 oz/SF) as appropriate.
B. Hot-dip galvanize bolts, nuts & washers according to ASTM A 153. Provide Class C coating (2.1 mils, 1.25 oz./SF for average of specimens tested).

2.8 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.
    1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    1. Liquid Penetrant Inspection: ASTM E 165.
    2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    3. Ultrasonic Inspection: ASTM E 164.
    4. Radiographic Inspection: ASTM E 94.
D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify the existing condition and configuration of the steel bridge girders prior to fabrication.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
C. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
    1. Level and plumb individual members of structure.
    2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
D. Splice members only where indicated.
E. Do not use thermal cutting during erection unless approved by the Contracting Officer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
    1. Joint Type: Snug tightened.

3.5 FIELD QUALITY CONTROL

A. Perform the following field inspections:
    1. Verify structural-steel materials and inspect steel frame joint details.
    2. Verify connection materials and inspect high-strength bolted connections.
B. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

3.6 REPAIRS AND PROTECTION

A. Touchup Galvanizing: Immediately after erection, clean exposed areas where galvanized coating is damaged or missing and apply a minimum of two coats of zinc-rich paint in accordance with ASTM A 780. See also Section 331000 for cold galvanization materials and application procedures.

PART - MEASUREMENT AND PAYMENT

3.1 Structural Steel – Misc (roof structure)

A. The structural steel shall not be measured separately for payment. Payment constitutes full compensation for all materials, labor, tools and incidentals necessary to complete the item.

END OF SECTION

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following miscellaneous flashing and trim and reglets necessary for conditions indicated.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Show layouts, profiles, shapes, seams, dimensions, and details for fastening, joining, supporting, and anchoring sheet metal flashing and trim.

C. Samples: Manufacturer's full range of available colors for each type of sheet metal flashing and trim for Architect's selection of colors.

1.3 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated or required by SMACNA for conditions indicated including:

1. Metal Roof and Wall Systems.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality (where not exposed to view).
2. Exposed Finishes: Apply the following coil coating:

a. High-Performance Organic Finish: Three-coat thermocured system containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605, except as modified for below:

1) Color(s) and Gloss: As selected by Architect from manufacturer's full range of available colors and finishes.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Felt Underlayment: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

1. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft..

C. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound.

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

2.3 REGLETS

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and –welded corners and junctions.

1. Manufacturers:

a. Cheney Flashing Company, Inc.
b. Fry Reglet Corporation.
c. Hickman, W. P. Company.

2. Material: 24 gauge Galvanized steel.
3. Color: Manufacturer’s standard Kynar finish as selected by Architect.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

D. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

E. Conceal fasteners and expansion provisions on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal, and in thickness not less than that of metal being secured.

2.5 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from prepainted material to match to metal roof panels.

B. Valley Flashing, Drip Edges, Eave, Rake, Ridge, and Hip Flashing: Fabricate from prepainted material to match to metal roof panel.

1. Prepainted, Metallic-Coated Steel: 0.0276 inch thick.

2.6 WALL SHEET METAL FABRICATIONS

A. Openings Flashing in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high end dams. Fabricate from the following material:

1. Prepainted, Metallic-Coated Steel: 0.0217 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

H. Seal joints with elastomeric sealant as required for watertight construction.

3.2 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.

1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 16-inch centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.

1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 16-inch centers.
2. Anchor interior leg of coping with screw fasteners and washers at 18-inch centers.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Secure in a waterproof manner. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.

2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.3 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Reglets: Installation of reglets is specified in Division 3 Section "Cast-in-Place Concrete," 4 Section "Unit Masonry" or if not specified as approved by submitted Shop Drawings. Coordinate questionable condition in the field with the Architect.

C. Openings Flashing in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings unless otherwise recommended by SMACNA's "Architectural Sheet Metal Manual" for conditions indicated.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Felt

A. This item is measured and paid for by the square feet of Felt in place at the contract unit price bid. Price and payment is full compensation for all materials, equipment, tools, labor, and for the performance of all work and incidentals necessary to complete the item.

4.2 Miscellaneous Fasteners and Steel Connections

A. This item is not measured for payment but will be paid for as a lump sum. Price and payment is full compensation for all materials, equipment, tools, labor, and for the performance of all work and incidentals necessary to complete the item.

4.3 Roof Flashing

A. This item is measured and paid for by the lineal foot of Roof Flashing in place at the contract unit price bid. Price and payment is full compensation for all materials, equipment, tools, labor, and for the performance of all work and incidentals necessary to complete the item.

END OF SECTION

SHEET SPECIFIC NOTES

1. COORDINATE WITH NWE REGARDING THE INSTALLATION OF A NEW UNDERGROUND 7.2 KV EXTENSION OF THEIR OVERHEAD LINE TO THE TRANSFORMER LOCATION.

2. IN THIS AREA, NWE WILL INSTALL A 120/240 SINGLE PHASE PAD MOUNTED TRANSFORMER AND A 200 AMP SERVICE TO THE CONTRACTOR INSTALLED METER BASE/LOAD CENTER.

THE CONTRACTOR SHALL INSTALL A 200 AMP, 120/240 VAC, SINGLE PHASE COMBINATION METER BASE/LOAD CENTER AS INDICATED ON THE CATALOG SHEET DRAWINGS.

3. FURNISH AND INSTALL FIXTURE 'B' IN THE LOCATION SHOWN. ORIENT FIXTURE TO PROVIDE ILLUMINATION OF THE TOILET FACILITY ENTRANCE, THE TRAIL HEAD AREA, AND A PORTION OF THE PARKING LOT, IN THIS ORDER.

USE #2 AL TRIPLEX URD WIRE BRANCH CIRCUIT DIRECT BURY URD INCLUDING THROUGH SLEEVES. PROTECT WITH A 2 POLE, 30 AMP BREAKER IN THE LOAD CENTER.

SHEET SPECIFIC NOTES CONT'D

4. FURNISH AND INSTALL FIXTURE 'A' IN THE LOCATIONS SHOWN. ORIENT FIXTURE TO PROVIDE TRAIL LIGHTING AS WELL AS ILLUMINATING THE AREA UNDER THE BRIDGE INCLUDING THE AREA NEAR WHERE THE BRIDGE DECK MEETS THE GRADE LEVEL.

USE #2 AL TRIPLEX URD + #6 AL GROUND WIRE DIRECT BURY INCLUDING THROUGH SLEEVES FOR THE BRANCH CIRCUIT. PROTECT BRANCH CIRCUIT WITH A 2 POLE, 30 AMP BREAKER IN THE LOAD CENTER.

5. END BRANCH CIRCUIT IN AN IN-THE-GROUND JUNCTION BOX NEAR THE BASE OF THE LAST FIXTURE 'A'. THUS THE BRANCH CIRCUIT COULD BE EXTENDED FROM THE JUNCTION BOX AT A LATER TIME TO SUPPLY 120 AND 240 VOLT LOADS.

~~6. FURNISH AND INSTALL A SCHEDULE 80 PVC SLEEVE TO PROTECT THE DIRECT BURY URD BRANCH CIRCUIT AS IT PASSES UNDERNEATH THE TRAIL. AT THE END OF THE PVC SLEEVE, FURNISH AND INSTALL AN IN-THE-GROUND JUNCTION BOX WITH SUFFICIENT SLACK TO ALLOW A FUTURE EXTENSION OF THE BRANCH CIRCUIT TO THE WEST.~~

SHEET SPECIFIC NOTES CONT'D

7. FURNISH AND INSTALL FIXTURE 'B' IN THE LOCATION SHOWN. ORIENT FIXTURE TO PROVIDE ILLUMINATION OF THE PARKING LOT AS INDICATED.

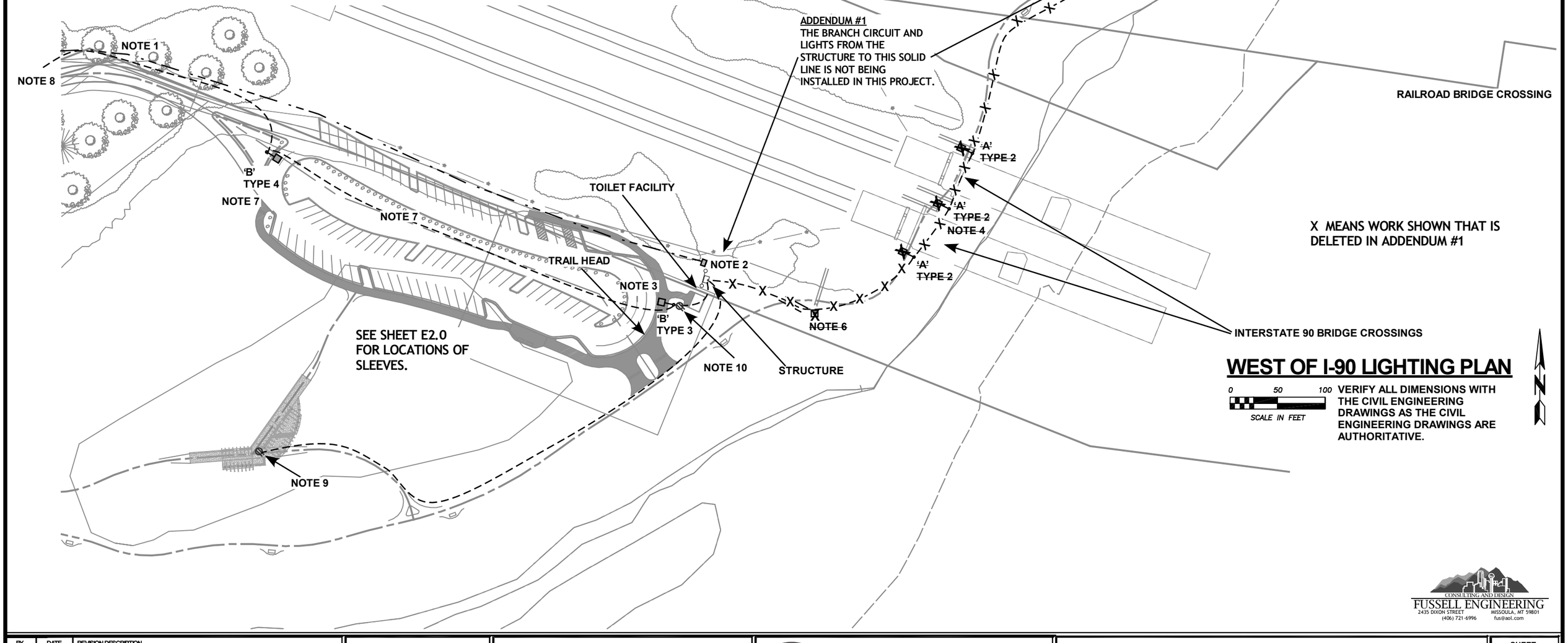
USE #2 AL TRIPLEX URD DIRECT BURY URD INCLUDING THROUGH PVC SLEEVES. THIS IS A CONTINUATION OF THE BRANCH CIRCUIT DESCRIBED IN NOTE 3, THIS SHEET. USE SLEEVES AS DESCRIBED ON SHEET E1.0.

8. TO FIXTURE 'B' LOCATED ON SHEET E1.0.

9. FURNISH AND INSTALL GFCI NEMA 5-20R RECEPTACLE WITH A WP COVER IN THE STONE WALL. SEE STRUCTUAL DRAWINGS. POWER FROM METER MAIN LOAD CENTER USING DIRECT BURY #10 UF AND A SINGLE POLE 20 AMP BREAKER. USE EMT ABOVE GRADE, SCHEDULE 80 PVC CONDUIT BELOW GRADE DOWN TO BURIAL DEPTH.

SHEET SPECIFIC NOTES CONT'D

10. FURNISH AND INSTALL GFCI NEMA 5-20R RECEPTACLE WITH A WP COVER IN THE LIGHT POLE. POWER FROM METER MAIN LOAD CENTER USING 3 — #12 THWN CU CONDUCTORS (HOT, NEUTRAL, GROUND) IN SCHEDULE 80 PVC CONDUIT AND A SINGLE POLE 20 AMP BREAKER. USE EMT ABOVE GRADE
.



WEST OF I-90 LIGHTING PLAN

0 50 100
SCALE IN FEET

VERIFY ALL DIMENSIONS WITH THE CIVIL ENGINEERING DRAWINGS AS THE CIVIL ENGINEERING DRAWINGS ARE AUTHORITATIVE.

CONSULTING AND DESIGN
FUSSELL ENGINEERING
2435 DIXON STREET MISSOULA, MT 59801
(406) 721-6996 fus@aol.com

BY	DATE	REVISION DESCRIPTION
MTF	4/26/17	ADDENDUM #1

DESIGN MTF PROJ NO 5943
DRAWN MTF DATE 05/2016
CHECKED MTF SURVEYED DJ&A

DJ&A, P.C.
CONSULTING ENGINEERS & LAND SURVEYORS
3203 Russell Street, Missoula, Montana 59801-8691
Phone 406/721-4320 Fax 406/549-8371

MONTANA STATE PARKS
REAL MONTANA. REAL CLOSE.

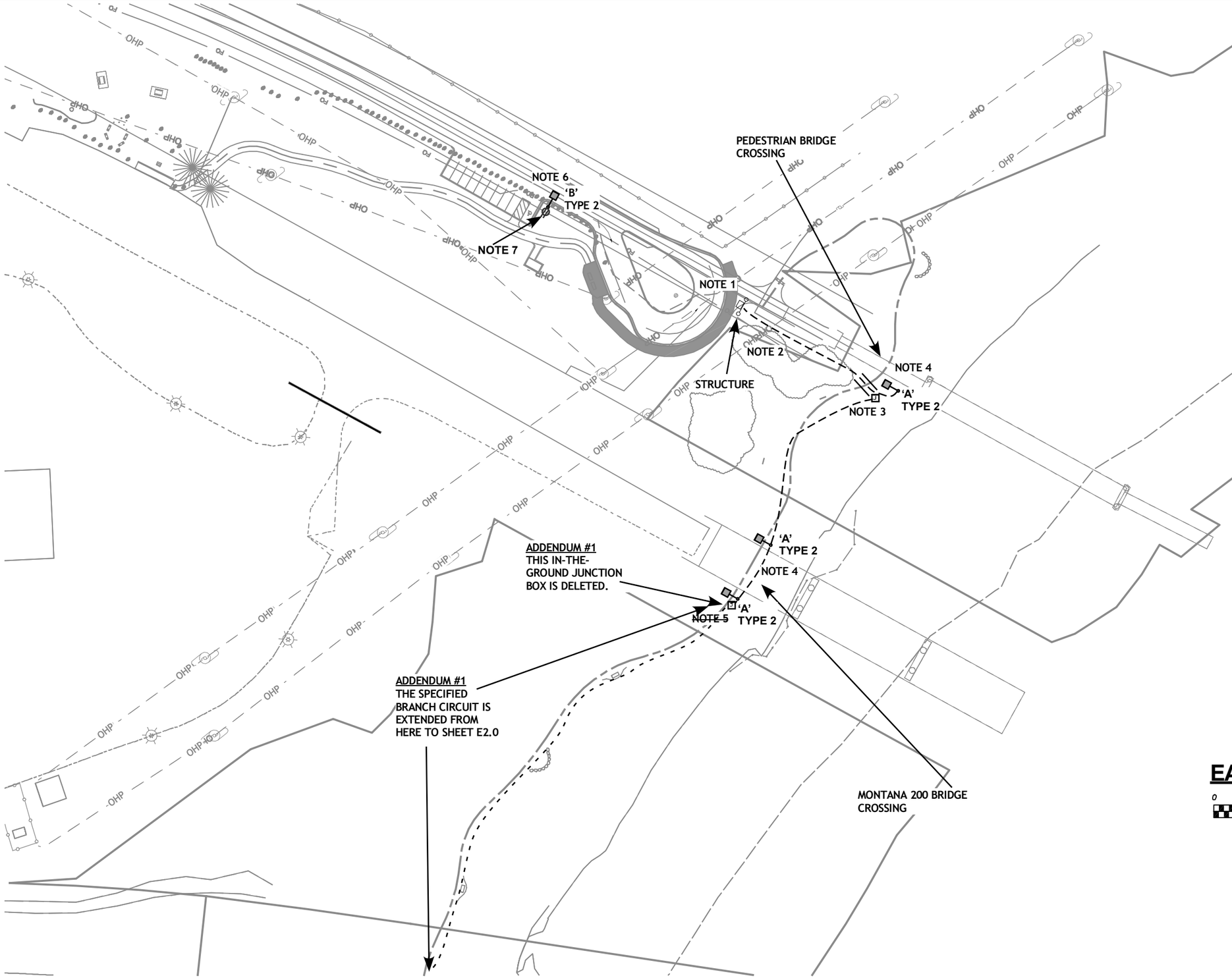
MT FISH, WILDLIFE & PARKS

MILLTOWN STATE PARK

ELECTRICAL SITE PLAN
AREA WEST OF I-90

042517

SHEET E 2.0 OF 11



SHEET SPECIFIC NOTES

1. THE CONTRACTOR SHALL INSTALL A 200 AMP, 120/240 VAC, SINGLE PHASE COMBINATION METER BASE/LOAD CENTER AS INDICATED ON THE CATALOG SHEET AND STRUCTURE DRAWINGS.

TAP THE EXISTING SERVICE SUPPLYING THE COUNTY METER/LOAD CENTER LOCATED ADJACENT TO THE BRIDGE ABUTMENT. SEE PHOTO SHEET E4.0. EXTEND THE EXISTING SERVICE TO THE NEW METER BASE/LOAD CENTER LOCATED ON THE STRUCTURE. COORDINATE WITH NWE.

LOCATE THE NEW METER BASE/LOAD CENTER COMBINATION NEAR THE COUNTY ELECTRICAL SERVICE WITHOUT BLOCKING ACCESS TO THE EXISTING COUNTY SERVICE. WHEN COMPLETED, A SINGLE NWE SERVICE WILL SUPPLY BOTH THE EXISTING COUNTY ELECTRICAL SERVICE AND THE NEW STATE PARK ELECTRICAL SERVICE.

2. ROUTE THE NEW BRANCH CIRCUIT DOWN THE EMBANKMENT TO THE TRAIL LOCATION. IT IS ACCEPTABLE TO FOLLOW THE TRAIL AROUND THE SWITCHBACK. IF SO, THEN A SCHEDULE 80 PVC SLEEVE WILL BE REQUIRED UNDERNEATH THE EXISTING COUNTY TRAIL.

3. FURNISH AND INSTALL A SCHEDULE 80 PVC SLEEVE TO PROTECT THE DIRECT BURY URD BRANCH CIRCUIT AS IT PASSES UNDERNEATH THE TRAIL. AT THE END OF THE PVC SLEEVE, FURNISH AND INSTALL AN IN-THE-GROUND JUNCTION BOX TO PROVIDE A 'T' JUNCTION EAST AND WEST AS INDICATED.

4. FURNISH AND INSTALL FIXTURE 'A' IN THE LOCATIONS SHOWN. ORIENT FIXTURE TO PROVIDE TRAIL LIGHTING AS WELL AS ILLUMINATING THE AREA UNDER THE BRIDGE INCLUDING THE AREA NEAR WHERE THE BRIDGE DECK MEETS THE GRADE LEVEL.

USE #2 AL TRIPLEX URD + #6 AL GROUND WIRE DIRECT BURY URD INCLUDING THROUGH SLEEVES AS THE BRANCH CIRCUIT. PROTECT BRANCH CIRCUIT WITH A 2 POLE, 30 AMP BREAKER IN THE LOAD CENTER.

~~5. END BRANCH CIRCUIT IN AN IN-THE-GROUND JUNCTION BOX NEAR THE BASE OF THE LAST FIXTURE 'A'. THUS THE BRANCH CIRCUIT COULD BE EXTENDED FROM THE JUNCTION BOX AT A LATER TIME FOR BOTH 120 VAC AND 240 VAC LOADS.~~

6. POWER FIXTURE 'B' USING #10 CU UF DIRECT BURY IN ACCORDANCE WITH THE TRENCHING DETAIL AND THE POLE BASE MOUNTING DETAIL. POWER FROM A SINGLE POLE 20 AMP BREAKER IN THE METER MAIN LOAD CENTER INSTALLED IN NOTE 1 THIS SHEET.

7. FURNISH AND INSTALL GFCI NEMA 5-20R RECEPTACLE WITH A WP COVER IN THE LIGHT POLE. POWER FROM EXISTING METER MAIN LOAD CENTER USING 3 — #12 THWN CU CONDUCTORS (HOT, NEUTRAL, GROUND) IN SCHEDULE 80 PVC CONDUIT AND A SINGLE POLE 20 AMP BREAKER. USE EMT ABOVE GRADE

EAST OF I-90 LIGHTING PLAN

0 50 100
SCALE IN FEET

VERIFY ALL DIMENSIONS WITH THE CIVIL ENGINEERING DRAWINGS AS THE CIVIL ENGINEERING DRAWINGS ARE AUTHORITATIVE.

N

FUSSELL ENGINEERING
CONSULTING AND DESIGN
2435 DIXON STREET MISSOULA, MT 59801
(406) 721-6996 fus@aol.com

BY	DATE	REVISION DESCRIPTION
MTF	4/26/17	ADDENDUM #1

DESIGN MTF PROJ NO 5943
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CHECKED MTF SURVEYED DJ&A

DJ&A, P.C.
CONSULTING ENGINEERS & LAND SURVEYORS
3203 Russell Street, Missoula, Montana 59801-8591
Phone 406/721-4320 Fax 406/549-6371

MONTANA STATE PARKS
REAL MONTANA. REAL CLOSE

MT FISH, WILDLIFE & PARKS
MILLTOWN STATE PARK

ELECTRICAL SITE PLAN
AREA EAST OF I-90

042517

SHEET E 3.0 OF 11

CONSTRUCTION AND MAINTENANCE AGREEMENT
FOR ACCESS ROAD TO MILLTOWN STATE PARK
BONNER, MT

RAILROAD 3rd SUBDIVISION RAILROAD MILEPOST 114.38

AGREEMENT, made this ____ day of _____, 2016, between the STATE OF MONTANA acting through its DEPARTMENT OF FISH, WILDLIFE AND PARKS, an executive branch agency of the State of Montana, hereinafter referred to as "DEPARTMENT", and MONTANA RAIL LINK, INC., hereinafter referred to as "RAILROAD".

WHEREAS, the DEPARTMENT is proposing to undertake a project, which includes construction and maintenance of a roadway on, along and across RAILROAD right-of-way located in Missoula County, Montana, as is more particularly shown on map marked as Exhibit "A" attached;

WHEREAS, the parties want this project to be constructed in accordance with plans and specifications to be prepared by DEPARTMENT;

WHEREAS, it will be necessary for RAILROAD to perform certain work on its facilities for this project;

WHEREAS, the DEPARTMENT will undertake the construction of said project and the RAILROAD will consent to the construction of said project upon the terms and conditions hereinafter stated and will receive no net benefit.

NOW, THEREFORE, in consideration of the premises herein contained, the parties agree:

I

The RAILROAD, in consideration of the sum of $2,200.00, shall recommend to the BNSF Railway Company (BNSF) that BNSF grant to DEPARTMENT, by separate instrument, an easement on its operating right-of-way, as shown on the attached Exhibit "A", for the construction, maintenance and operation of a roadway.

II

The DEPARTMENT will construct or cause to construct, and thereafter own and maintain the roadway facility in compliance with plans and specifications developed by the DEPARTMENT. Nothing provided in this agreement will be construed or deemed to be ratification or an adoption by the RAILROAD of either or both said plans and specifications as its own.

The DEPARTMENT will present the attached Exhibit "C", contractor requirements for work on the right-of-way of the RAILROAD, to its contractor. The DEPARTMENT's contractor will comply with all aspects of this attachment. There will be no equipment, manpower or work on the right-of-way of the RAILROAD prior to approval by the RAILROAD. **The DEPARTMENT's contractor(s) will telephone the RAILROAD's Communication Network Control Center at**

(800) 338-4750 (a 24-hour number), and Utilities Underground Location Center **(800) 424-5555**, to determine if underground utilities or communication facilities are buried anywhere in the area.

Should it become necessary for the RAILROAD to obtain the services of a consultant engineer or a contractor after this agreement is completed, and due to any exigency of the RAILROAD and the project, the DEPARTMENT and the RAILROAD will mutually agree, in writing, as to the area of need and the RAILROAD's selection of a consultant or contractor.

III

The DEPARTMENT and the RAILROAD will perform various items of work as follows:

PART A
WORK TO BE PERFORMED BY THE DEPARTMENT OR ITS CONTRACTOR AT DEPARTMENT EXPENSE:

1. Except as otherwise herein provided, furnish all plans, engineering, supervision, labor, material, supplies and equipment necessary for construction of the project, complete in all details.

2. Perform all work not specifically mentioned as work performed by the RAILROAD necessary to complete the project in accordance with plans and specifications including construction of roadway within the right of way of the RAILROAD.

3. Install and maintain fences on or near the RAILROAD's right of way as shown on the plans and in the specifications for this project.

4. Install and maintain a "roof structure", attached to the RAILROAD's Bridge 114.1 above this access road, as shown on the plans and in the specifications for this project.

5. Install and maintain temporary road approaches leading to and from temporary railroad grade crossings near the RAILROAD's Milepost 113.95, as shown on the plans and in the specifications for this project. The DEPARTMENT will install a lockable gate on the north road approach to these temporary railroad crossings at a location acceptable to RAILROAD. Use of this gate and access to the temporary railroad crossings will be under the direct control of an employee of the RAILROAD. Only an employee of the RAILROAD may lock or unlock this gate and authorize use of the temporary road approaches and railroad grade crossings.

6. The temporary road approaches, near the RAILROAD's Milepost 113.95, will be removed upon completion of those sections of trail between the RAILROAD's right of way and the State of Montana's highway right of way.

7. Any work or modification which, under this contract, may be performed by the contractor will nevertheless be the obligation of the DEPARTMENT, and the RAILROAD will be entitled to look to the DEPARTMENT for full performance thereof.

PART B

WORK TO BE PERFORMED BY THE RAILROAD AT THE DEPARTMENT'S EXPENSE:

1. Provide railroad flagging protection during construction as deemed necessary by the RAILROAD.

2. Install, maintain, and remove temporary timber plank crossing surfaces on its main line and siding tracks to a length of at least 24 feet. These plank surfaces shall be removed upon removal of the road approaches described in Section III, Part A, Item 5 of this agreement.

PART C

SEQUENCE OF OPERATION:

The DEPARTMENT will invite the RAILROAD to a preconstruction conference, if such a conference is held.

IV

All work to be done by the DEPARTMENT or its contractor on the RAILROAD's right-of-way, will be done in a manner satisfactory to the RAILROAD and will be performed so as not to unnecessarily interfere with the movement of trains or traffic upon the track. The DEPARTMENT will require its contractor to take precautions to avoid damage to or interfere with the RAILROAD's track or trains and to notify the RAILROAD, as per Exhibit "C", whenever the contractor is about to perform work on, or adjacent to its track to enable the RAILROAD to furnish flagging and other necessary protective services and devices to ensure the safety of railway operations. The RAILROAD can furnish such flagging and protective services and devices that, in its judgment, are necessary to ensure the safety of railway operations, and the DEPARTMENT will reimburse the RAILROAD for the cost thereof. Whenever safeguarding of the trains or traffic of the RAILROAD is mentioned in this agreement, it is intended to include all permitted users of the RAILROAD's track.

The DEPARTMENT, its contractors and subcontractors shall plan, schedule, coordinate and conduct all work so as not to cause any delay to any train.

V

The DEPARTMENT will reimburse the RAILROAD for the work it performs pursuant to this agreement. The RAILROAD may assign any receivables due under this Agreement, provided, however, such assignment will not relieve the assignor of any of its rights or obligations under this agreement.

The estimated cost of work, except flagging, to be performed under this agreement by the RAILROAD's forces at the expense of the DEPARTMENT is shown on detailed estimate attached as Exhibit "B" and made a part of this agreement.

The RAILROAD has reviewed and inspected the materials in the field prior to signing this agreement. The salvage value of the materials, if any, to be retained by the RAILROAD is shown on the attached Exhibit "B." The RAILROAD will dispose of all scrap from the railroad's work covered in this agreement at DEPARTMENT expense.

The RAILROAD may submit progress bills to the DEPARTMENT during the progress of the work included in this agreement for the actual cost of services and expenses incurred by the RAILROAD. The DEPARTMENT will reimburse the RAILROAD for the actual cost and expense incurred in connection with said work.

It is further agreed that the final and complete billing of all incurred costs will be made by the RAILROAD at the earliest practical date and that a final audit and review will be made by the DEPARTMENT. Records are to be available to the DEPARTMENT or their authorized representatives for audit during the contract period and for a period of three (3) years from the date of final payment.

VI

All contracts between the DEPARTMENT and a contractor, for the construction provided for, or maintenance work on the roadway within the RAILROAD right-of-way, will require the contractor to indemnify, defend, and hold harmless the RAILROAD and any other railroad company occupying or using the RAILROAD's right-of-way, or line of RAILROAD, against all loss, liability and damage including attorney's fees arising from activities of the contractor, its forces or any of its subcontractors or agents, and will further provide that the contractor will carry insurance of the kind and amount hereinafter specified:

A. Commercial General Liability Insurance

Each Occurrence	Not less than $2,000,000
Personal Injury & Advertising Injury	Not less than $1,000,000
General Aggregate	Not less than $2,000,000
Products – Completed OPS Aggregate	Not less than $2,000,000

RAILROAD must be listed as additional insured
Commercial General Liability policy shall be endorsed "Contractual Liability – Railroads"
ISO form CG 2417 or equivalent

B. Automobile Insurance

Combined Single Limit Not less than $1,000,000

RAILROAD must be listed as additional insured

C. Workers Compensation Statutory

Certificates of Insurance must be provided to the RAILROAD prior to commencement of work for all policies described above.

D. **Railroad Protective Liability** insurance naming only the RAILROAD as the Insured with coverage of at least $2,000,000 per occurrence and $6,000,000 in the aggregate. The policy must be issued on a standard ISO form CG 00 35 10 93 and include the following:
*Endorsed to include the Pollution Exclusion Amendment (ISO form CG 28 31 10 93)
*Endorsed to include the Limited Seepage and Pollution Endorsement
*Endorsed to remove any exclusion for punitive damages
*No other endorsements restricting coverage may be added

The original policy must be provided to the RAILROAD prior to performing any work or services under this Agreement.

Not more frequently than every five years, RAILROAD may ask to reasonably modify the required insurance coverage to reflect then-current risk management practices in the railroad industry and underwriting practices in the insurance industry.

Acceptance of a certificate that does not comply with this section shall not operate as a waiver of Contractor's obligations hereunder.

The fact that insurance (including, without limitation, self-insurance) obtained by Contractor shall not be deemed to release or diminish the liability of Contractor including, without limitation, liability under the indemnity provisions of this Agreement. Damages recoverable by RAILROAD shall not be limited by the amount of the required insurance coverage.

ALL certificates of insurance required for contractor performed construction and/or maintenance work will be forwarded to the RAILROAD at the following address:

MONTANA RAIL LINK INC.
Office of the Chief Engineer
P.O. Box 16390
Missoula, MT 59808-6390
(406) 523-1440 Office
(406) 523-1529 Fax

If the DEPARTMENT, its contractor, subcontractors, or agents, in the performance of the work herein provided for or by the failure to do or perform anything for which it is responsible under the provisions hereof, shall damage or destroy any property of the RAILROAD, such damage or destruction shall be corrected by the DEPARTMENT in the event its contractor or the insurance carriers fail to repair or restore the same.

VII

Upon completion of the work herein stated, the DEPARTMENT will require its contractor to leave the RAILROAD right-of-way in a condition satisfactory to the RAILROAD. This determination shall be made by the RAILROAD's Chief Engineer or his designee.

VIII

The DEPARTMENT agrees that in removing snow from said roadway, that the DEPARTMENT will perform such snow removal in a manner as not to deposit the snow or debris on the roadbed or tracks of the RAILROAD. Any snow or debris deposited on the roadbed or track sections by actions of the DEPARTMENT will be removed by the RAILROAD with such costs of removal billed against the DEPARTMENT. The RAILROAD agrees to notify the DEPARTMENT of any ongoing problem in this area.

IX

The DEPARTMENT will own and maintain the roadway and all appurtenances thereto. The DEPARTMENT will be responsible for all future maintenance, repair, improvement, modification or replacement, as needed, based upon prevailing warrants, guidelines and conditions.

The DEPARTMENT agrees that it will do nothing and permit nothing to be done in the maintenance of the roadway which will interfere with or endanger facilities of the RAILROAD.

X

In the event said roadway shall, at any time, cease to be used by the public or otherwise become vacated or abandoned, the rights and benefits of the DEPARTMENT under this agreement shall immediately cease, and the DEPARTMENT shall remove said roadway at its own cost and expense. To facilitate the DEPARTMENT's removal of the roadway, the RAILROAD will issue to the DEPARTMENT, at no cost or expense, a permit to accomplish said removal. If after a reasonable time the DEPARTMENT has not removed the facility, the RAILROAD, after providing the DEPARTMENT a minimum of 60 days prior notification, may remove said facility at the expense of the DEPARTMENT.

XI

All notices, billings, payments, and other required communications ("Notices") to the Parties shall be in writing, and shall be addressed respectively as follows:

If to **DEPARTMENT**: DEPARTMENT OF FISH, WILDLIFE AND PARKS
Region 2 Park Manager
3201 Spurgin Road
Missoula, MT 59804
Telephone (406) 542-5517

If to **RAILROAD:** MONTANA RAIL LINK INC.
Office of the Chief Engineer
P.O. Box 16390
Missoula, MT 59808-6390
Telephone (406) 523-1440
FAX (406) 523-1529

All notices shall be given (i) by personal delivery to the Parties, or (ii) by electronic communication, with a confirmation sent by mail, or (iii) by mail. All notices shall be effective and shall be deemed delivered (i) if by personal delivery on the date of delivery if delivered during normal business hours, and, if not delivered during normal business hours, on the next business day following delivery, (ii) if by electronic communication on the next business day following receipt of the electronic communication, or (iii) if solely by mail on the next business day after actual receipt. Any Party may change its address by notice to the other Parties.

XII

This agreement will be binding on the parties hereto, their successors and assigns.

MONTANA RAIL LINK, INC.

By: _____

Title**:** _____

DEPARTMENT OF FISH, WILDLIFE AND PARKS

By: _____

Title**:** _____

Exhibit C - Requirements for Contractors, Public Employees and Others (hereinafter referred to as Contractor) when working on the Railroad's Right of Way

(Note – these requirements **do not** apply to railroad workers and/or contractors or firms working for the Railroad). Any railroad worker, contractor, or firm doing work for the Railroad shall comply with the terms and conditions of their contract.)

1.01 General

1.01.01 The Contractor shall plan, schedule and conduct all work activities so as not to interfere with the movement of any trains on Railroad Property.

1.01.02 The Contractor's right to enter the Railroad's Property is subject to the absolute right of the Railroad to cause the Contractor's work on the Railroad's Property to cease if, in the opinion of the Railroad, Contractor's activities create a hazard to the Railroad's Property, employees, and/or operations.

1.01.03 The Contractor is responsible for determining and complying with all Federal, State and Local Governmental laws and regulations, including, but not limited to, environmental, health and safety. The Contractor shall be responsible for and indemnify and save the Railroad harmless from all fines or penalties imposed or assessed by Federal, State and Local Governmental Agencies against the Railroad which arise out of Contractor's work.

1.01.04 For false work, above any tracks or any excavations located, whichever is greater, within twenty-five (25) feet of the nearest track or intersecting a slope from the plane of the top of rail on a 1 1/2 horizontal to 1 vertical slope beginning at eleven (11) feet from center line of the nearest track, both measured perpendicular to center line of track, the Contractor shall furnish to the Railroad five sets of working drawings showing details of construction affecting Railroad Property and tracks. The working drawings shall include the proposed method of installation and removal of false work, shoring or cribbing not included in the contract plans and two sets of structural calculations of any false work, shoring or cribbing. All calculations shall take into consideration railroad surcharge loading and shall be designed to meet American Railway Engineering and Maintenance-of-Way Association (previously known as American Railway Engineering Association) Coopers E-80 live loading standard. All plans and drawings must be approved by the Railroad. The Contractor shall be required to use lifting devices, such as cranes and/or winches, to place or to remove any false work over the Railroad's tracks. In no case shall the Contractor be relieved of responsibility for results obtained by the implementation of said approved plans.

1.01.05 Subject to the movement of the Railroad's trains, the Railroad will cooperate with the Contractor such that the work may be handled and performed in an efficient manner. The Contractor shall have no claim whatsoever for any type of damages in the event his work is delayed by the Railroad.

1.01.06 The Contractor shall take protective measures as are necessary to keep the Railroad's facilities, including track ballast, free of sand, debris, and other foreign objects and materials resulting from his operations. Any damage to Railroad facilities resulting from Contractor's operations will be repaired or replaced by the Railroad and the cost of such repairs or replacement shall be paid for by the Contractor.

1.01.07 The Contractor shall abide by the following clearances during construction,

25'-0" Horizontally from centerline of the nearest track.

23'-0" Vertically above top of rail

1.01.08 The Contractor shall not move any equipment or materials across the Railroad's track unless at a public road crossings, or approved temporary crossing and permission has been obtained from the Railroad.

1.01.09 Discharge, release or spill on Railroad Property of any hazardous substances in excess of a reportable quantity or any hazardous waste is prohibited and Contractor shall immediately notify the Railroad's Chief Dispatcher at 1(800) 338-4750, of any discharge, release or spills. Contractor shall not allow Railroad Property to become a treatment or storage facility as those terms are defined in the Resource Conservation and Recovery Act or any state analogue.

1.01.10 The Contractor, upon completion of the work covered by this contract, shall promptly remove from the Railroad's Property all of Contractor's tools, equipment, implements and other materials, whether brought upon said property by said Contractor or any subcontractor, employee or agent of Contractor or of any subcontractor, and shall cause the Railroad's Property to be left in a condition acceptable to the Railroad's representative.

1.02 Protection of Railroad Facilities and Railroad Flagger Services:

1.02.01 The Contractor must provide notification to the Railroad's local track supervisor a minimum of 48 hours prior to entry upon the Railroad's right of way. For this project the local supervisor is **Dustin Hayes who can be reached at 406-523-1526 or cell number 406-370-6683.**

1.02.02 For work within 25 feet of any track, employees and agents of the Contractor must attend a safety job briefing to be held by the local track supervisor or his representative. **With very few exceptions, all work within 25 feet of any track, must be performed under the direction and supervision of a Railroad flagman.** All costs associated with providing a Railroad flagman will be the responsibility of the Contractor. A safety job briefing must be held with the Railroad's representative whenever conditions, procedures or responsibilities change. At a minimum, one job briefing will be held each day before the start of work.

1.03 Contractor Safety Requirements

1.03.01 Any Contractor employee, its subcontractor's employee, agents or invites under suspicion of being under the influence of drugs or alcohol, or in the possession of same, will be removed from the Railroad's Property and subsequently released to the custody of a representative of the Contractor. Future access to the Railroad's Property by that employee will be denied.

1.03.02 All persons are prohibited from having pocketknives with blades in excess of three (3) inches, firearms or other deadly weapons in their possession while working on Railroad Property.

1.03.03 All personnel protective equipment used on Railroad Property shall meet applicable OSHA and ANSI specifications. Railroad personnel protective equipment requirements are; a) safety glasses with side shields, b) hard hats, c) safety shoes: hardened toe, above-the-ankle lace-up with a defined heel and d) high visibility retro-reflective orange vests as required by the Railroad's representative in charge of the project. Hearing protection, fall protection and respirators will be worn as required by State and Federal regulations.

1.03.04 The Contractor shall not pile or store any materials, machinery or equipment closer than 25'-0" to the centerline of the nearest Railroad track. At highway/rail at-grade crossings, materials, machinery or equipment shall not be stored or left temporarily which interferes with the sight distances of motorists approaching the crossing. Prior to beginning work, the Contractor will establish a storage area with concurrence of the Railroad's representative.

1.03.05 Machines or vehicles must not be left unattended with the engine running. Parked machines or equipment must be in gear with brakes set and, if equipped with blade, pan or bucket, they must be lowered to the ground. All machinery and equipment left unattended on Railroad Property must be left inoperable and secured against movement.

1.03.06 Workers must not create and leave any conditions at the work site that would interfere with water drainage. Any work performed over water shall meet all Federal, State and Local regulations.

1.04 Excavation

1.04.01 Before excavating, it must be ascertained by the Contractor if there are any underground pipe lines, electric wires, or cables, including fiber optic cable systems, that either cross or run parallel with the track and are located within the project's work area. Excavating on Railroad Property could result in damage to buried cables resulting in delay to Railroad traffic, including disruption of service to users resulting in business interruptions involving loss of revenue and profits. Before any excavation commences, the Contractor must contact the Railroad's Signal

Supervisor and Roadmaster. All underground and overhead wires must be considered HIGH VOLTAGE and dangerous until verified with the company having ownership of the line. It is also the Contractor's responsibility to notify any other companies that have underground utilities in the area and arrange for the location of all underground utilities before excavating.

1.04.02 The Contractor must cease all work and the Railroad must be notified immediately before continuing excavation in the area if unexpected obstructions are encountered. If the obstruction is a utility, and the owner of the utility can be identified, then the owner should also be notified immediately. If there is any doubt about the location of underground cables or lines of any kind, no work will be performed until the exact location has been determined. There will be no exceptions to these instructions.

1.04.03 All excavations shall be conducted in compliance with applicable OSHA regulations, and regardless of depth, shall be shored where there is any danger to tracks, structures or personnel.

1.04.04 Any excavations, holes or trenches on Railroad Property must be covered, guarded and/or protected when not being worked on. When leaving work site areas at night and over weekends, all areas must be secured and left in a condition that will ensure that Railroad employees and other personnel who may be working or passing through the area are protected from all hazards. All excavations must be back filled as soon as possible.

1.05 Hazardous Waste, Substances and Material Reporting

1.05.01 If Contractor discovers any hazardous waste, hazardous substance, petroleum or other deleterious material, including but not limited to any non-containerized commodity or material, on or adjacent to the railroad's Property, in or near any surface water, swamp, wetlands or waterways, while performing any work under this Agreement, Contractor shall immediately: (a) notify the Railroad's Chief Dispatcher at 1(800) 338-4750, of such discovery: (b) take safeguards necessary to protect its employees, subcontractors, agents and/or third parties: and (c) exercise due care with respect to the release, including the taking of any appropriate measure to minimize the impact of such release.

1.06 Insurance Requirements

1.06.01 For projects involving construction or demolition on the Railroad’s Right of Way, the Contractor will provide proof of insurance which conforms to the current requirements of the Railroad. Unless specifically notified that Railroad Protective Insurance is not required, the Contractor should assume Railroad Protective Insurance is required.

1.07 Personal Injury Reporting

1.07.01 The Railroad is required to report certain injuries as a part of compliance with Federal Railroad Administration (FRA) reporting requirements. Any personal injury sustained by an employee of the Contractor, subcontractor or Contractor's invites while on the Railroad's Property must be reported immediately (by phone mail if unable to contact in person) to the Railroad's representative in charge of the project. The Non-Employee Personal Injury Data Collection Form contained herein is to be completed and sent by Fax to the Railroad at 1(406) 523-1529 and to the Railroad's representative no later than the close of shift on the date of the injury.

NON-EMPLOYEE PERSONAL INJURY DATA COLLECTION

INFORMATION REQUIRED TO BE COLLECTED PURSUANT TO FEDERAL REGULATION. IT SHOULD BE USED FOR COMPLIANCE WITH FEDERAL REGULATIONS ONLY AND IS NOT INTENDED TO PRESUME ACCEPTANCE OF RESPONSIBILITY OR LIABILITY.

1. Accident City/St _____ 2. Date: _____ Time:

County: _____ 3. Temperature: _____ 4. Weather

5. Social Security #

6. Name (last, first, mi)

7. Address: Street: _____ City: _____ St._____ Zip:

8. Date of Birth: _____ and/or Age _____ Gender:
(if available)

9. (a) Injury: _____ (b) Body Part:
[i.e. (a) Laceration (b) Hand]

11. Description of Accident (to include location, action, result, etc.):

12. Treatment:
- G First Aid Only
- G Required Medical Treatment
- G Other Medical Treatment

13. Dr. Name _____ 30. Date:

14. Dr. Address:
Street: _____ City: _____ St: _____ Zip:

15. Hospital Name:

16. Hospital Address:
Street: _____ City: _____ St: _____ Zip:

17. Diagnosis:

FAX TO
RAILROAD AT (406) 523-1529
AND COPY TO
RAILROAD REPRESENTATIVE